



Richard von Mises' work for ZAMM until his emigration in 1933 and glimpses of the later history of ZAMM

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In an earlier article in this journal (Siegmund-Schultze 2020, in the following quoted as [RS-Mises-2020]) I dealt with the founding history of the *Zeitschrift für Angewandte Mathematik und Mechanik* (ZAMM) in the years 1920 and 1921. At the end (pp. 16–21) I gave a first short and general overview of the activities of the editor Richard von Mises (1883–1953) between 1921 and 1933. In this follow-up article, I will first go a bit further into this latter topic in two directions: with regard to Richard von Mises' (hereafter abbreviated as RvM) co-workers at ZAMM and with regard to his own publications in the journal. Secondly, I will discuss RvM's departure from ZAMM in 1933 and his necessarily sporadic relationship with ZAMM during his emigration to Turkey. I will also take a brief look at the continuation of ZAMM under RvM's successors Trefftz and Willers during the Nazi era.

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In the third and last section, I discuss RvM's failed participation in the founding of the American *Quarterly of Applied Mathematics* (1943), which was in some respect inspired by ZAMM, and RvM's and Hilda Geiringer's contacts with ZAMM until RvM's death in Cambridge (USA) in July 1953. For biographical information on the early years of RvM's life, who was born in 1883 in Lemberg [today Lviv in Ukraine] under the Habsburg monarchy, I refer to the earlier article in ZAMM and the literature mentioned there.

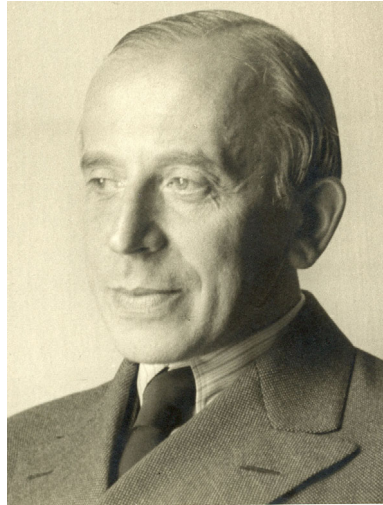


FIGURE 1 Richard von Mises (1883–1953) – Courtesy of Magda Tisza (Boston)

1 | ASPECTS OF VON RvM'S WORK FOR ZAMM (1921–1933)

In the first part of this work [RS-Mises-2020] I mentioned that RvM followed his own 1920 “Programm” for ZAMM with respect to editorial principles, while his introductory article “Tasks and Goals” (Mises 1921) became the authoritative one for the scientific content. In particular, I emphasized the international dimension of ZAMM, RvM's search for the best balance between mathematical-theoretical and experimental contributions, and the subliminal institutional conflict between Berlin and Göttingen. Not much could yet be said about the scientific content of ZAMM.

A complete historical analysis of the approximately $6 \times 80 \times 13 = 6240$ pages of ZAMM in the 13 years under RvM's leadership (1921–1933) is not realistic in this continuation article either. I will focus instead on RvM's activities as editor. He was involved in all aspects, both organizationally and in terms of content. With the innovative structure of the journal, which RvM deliberately aimed at, about 50% of the content was reserved for “scientific reporting” in addition to the original papers. The latter included not only reports and reviews of scientific literature from Germany and abroad as

Tabelle: Anzahl der Publikationen (Hauptaufsätze, Vortragsauszüge und kurze Zusammenfassungen) in der ZAMM von 1921 bis 1944

Wissenschaftsgebiet	1921/26	1927/32	1933/38	1939/44
Hydro- und Aerodynamik	51	75	128	65
Elastizitäts-, Festigkeitslehre, Plastizität	86	66	75	38
Schwingungen	8	16	22	14
Allgemeine Mechanik, Baumechanik, Statik, Kinematik	33	30	24	11
Praktische Analysis und Algebra	16	25	22	14
Wahrsch., Statistik, Wirtsch., Versicherungsmath.	14	15	12	6
Elektrizitätslehre, Elektrotechnische Optik, Wärmelehre	16	42	15	6
Nomographie, Tafelwerke, Tabellen	–	1	3	6

FIGURE 2 Publication figures in ZAMM 1921-1944 – Source (Tobies 1982, 21). Permission Springer Nature

well as biographical contributions, but also so-called “news” (Nachrichten) about organizational developments in higher education, research and training, which were often written anonymously and in these cases originated directly from RvM.

It is more realistic to take a closer look at RvM’s own publications in ZAMM, which themselves were of very different nature, including original treatises, reviews and anonymous communications. Thus, the biographical perspective and the focus on RvM’s person gain a more general meaning. Under RvM, ZAMM became a mirror (in part certainly subjectively influenced by the position of the editor) of the history of applied mathematics in Germany in the 1920s and early 1930s. Even in its considerable length, the present publication can offer only a few excerpts from the eventful history of ZAMM in its first 2 decades and, by providing precise references to the sources, may encourage the reader to read the original German articles in ZAMM.

1.1 | RvM’s co-workers at ZAMM, in particular Hilda Geiringer

RvM was supported on different levels by established and younger scientists in his work at ZAMM.

Among the established ones were the six, later seven, men appearing on the title page under “Mitwirkung.” This “cooperation” – especially with regard to the mediation of manuscripts – can best be documented from the papers of Ludwig Prandtl and Theodor von Kármán.¹ RvM’s colleague at the University of Berlin, the predominantly “pure” mathematician Ludwig Bieberbach (1886–1982), wrote 16 book reviews and some small contributions of an applied nature in RvM’s period in ZAMM.² Among the established ones were friends and acquaintances abroad such as Philipp Frank (1884–1966) and Kamillo Körner (1868–1943) in Prague, as well as Ernst Fanta (1878–1939) in Vienna, who occasionally wrote book reviews and a few articles. Among the academically not yet established authors in ZAMM were, besides the numerous students of Prandtl and Kármán (some examples below), the important Heinrich Hencky (1885–1951), who was almost the same age as RvM, and who published five influential papers on plasticity theory in ZAMM between 1923 and 1925.³ Prandtl, RvM himself and A. Reuss⁴ published further important papers on this topic in ZAMM in the 1920s. The versatile contribution of ZAMM to plasticity theory, which, along with hydrodynamics (boundary layer theory, turbulence, etc.), was to become one of the most important fields in the journal of those years, has been partly described in several detailed historical articles in this journal in recent years.⁵

RvM’s most important co-worker at ZAMM was undoubtedly Hilda Geiringer (1893–1973), originally from Vienna, since 1943 his wife in American emigration, who also took over a large part of the teaching activities at the university.⁶ (More on Geiringer below)

Also from Vienna were two other co-workers at ZAMM, RvM’s former war comrade in the Austrian “Fliegerarsenal” (Flying Corps) during the war and assistant in Dresden 1919/20 Julius Ratzersdorfer (1889–1965), and Gerda Laski (1893–1928).

Ratzersdorfer, who, like RvM, was forced to emigrate in 1934, published two joint articles with RvM in ZAMM on structural mechanics (see below) as well as several “Kurze Auszüge” (Short Excerpts = journal reviews) on this field. He wrote 54 book reviews for ZAMM.

The physicist Gerda Laski, who also maintained a close personal relationship with RvM until her early death from cancer,⁷ has, according to a short anonymous obituary by RvM, “occasionally contributed small notices and papers to the journal” (ZAMM 8: 504).⁸

¹ Available at the Archives of the Max Planck Society in Berlin (Prandtl Papers) and at the Archives of the California Institute of Technology (Caltech) in Pasadena (Kármán Papers). More details below in Section 1.2. using the example of von Kármán.

² The numbers of publications of individual persons in ZAMM occasionally mentioned below can be confirmed by electronic search on the ZAMM website.

³ For the biography of Hencky see (Tanner/Tanner 2003). Hencky had a complicated career path, which took him to the Ukraine and later to the USA. In the early 1920s, he was first in Dresden (with RvM’s former doctoral student Trefftz), then in Delft with RvM’s close Dutch colleagues C.B. Biezeno and J.M. Burgers.

⁴ Regarding Reuss and RvM see further down in Section 1.2.

⁵ (Popov/Gray 2012), (Dyck/Böhlke 2020). O. Bruhns translated the influential work (Hencky 1924/2020) into English. He published it and commented on it in ZAMM (Bruhns 2014, 2020). See also the editorials (Altenbach 2020b,c).

⁶ See information about her in various places in [RS-Mises-2020]. In the 1920s and 1930s she published under the name Pollaczek-Geiringer due to her short (1922–1924) marriage with the later well-known engineer and mathematician Felix Pollaczek (1892–1981), also from Vienna. I will always quote her as Hilda Geiringer, the name which she resumed later on. See in particular (Binder 1992) und (Siegmond-Schultze 1993). On Geiringer’s role in the “Mathematische Praktikum” (mathematical practical course) at the university see (Siegmond-Schultze forthcoming).

⁷ Geiringer writes in an unpublished handwritten German manuscript “Mathematische Entwicklung” (Mathematical Development) around 1970 that her friend Laski arranged for her to be hired at RvM’s institute in 1922 (Siegmond-Schultze 1993, 367). The 72-page manuscript, which I was able to inspect in 1993 at Geiringer’s daughter Magda Tisza (born 1922) in Boston, seems to have been lost afterwards.

⁸ As in the first part of this work, in order to save space, I shall refer directly to volumes and pages of the journal in many places by (ZAMM x: p. y). The year of foundation 1921 and the volume count, which has been retained until today, creates a simple correlation between calendar year and volume

With the exception of Ludwig Prandtl, Bieberbach and Hencky, all those named so far came from Vienna, Linz (Körner) or (like the Hungarian Theodor (Tódor) von Kármán) from other territories ruled by the Habsburg monarchy until the end of the First World War. RvM's particularly close, even emotional relationship with his Austrian homeland cannot be doubted. He is well known for his intensive occupation (including publications of his own) with the poetic work of Rainer Maria Rilke and the philosophical writings of Ernst Mach. In 1925, in a discussion conducted in ZAMM about the quality of education of mathematics and engineering in Germany and Austria, RvM wrote, undoubtedly including himself:

“I think it is a fact sufficiently well known in professional circles that an extraordinarily large number of engineers originating from Austrian schools work in the German Reich in precisely those places where particularly high theoretical demands are made.” (Mises 1925b, 181)

Hilda Geiringer held the only publicly paid assistant post at RvM's Institute for Applied Mathematics at Berlin University since 1922. She was introduced to applied mathematics by RvM after her doctorate in pure mathematics under Wilhelm Wirtinger (1917) in Vienna. During RvM's years at ZAMM between 1921 and 1933 she published in this journal a total of eight articles, 38 book reviews, a “Kleine Mitteilung”⁹ (Short Communication) and two “Zusammenfassende Berichte” (Summary Reports), the latter a two-part, quite influential joint publication “Practical methods for solving equations” (Mises/Pollaczek-Geiringer 1929) (see Section 1.3. below).



FIGURE 3 Hilda Geiringer ca. 1945 – Credit Wheaton College, Norton (Mass.)

During her Viennese years, Geiringer was involved politically left-wing in youth, women's and adult education (Volkshochschule) movements, and in 1922 she wrote the book “Die Gedankenwelt der Mathematik” (The intellectual world of mathematics), which was influenced by Ernst Mach and also contained psychoanalytic elements of interpretation (Geiringer 1922). It was a good start of her relationship with RvM that the latter dedicated a very positive review to her book in ZAMM:

“In summary, although one might wish for clearer and more mature judgments here and there, the work is a fine achievement, an original and gratifying enrichment of literature, worthy of attention, worthy of dissemination and, above all, worth reading.” (ZAMM 2: 224)

Geiringer's factually and politically controversial habilitation procedure for applied mathematics (Siegmond-Schultze 1993) at the University of Berlin in 1927 led to four publications. Geiringer had been forced by the commission, in particular by Ludwig Bieberbach, to submit, in addition to the objectionable original paper on the structure of plane and spatial trusses,¹⁰ another one on probability distributions, which, however, initially also contained a minor error.

Three of these four publications appeared between 1927 and 1932 in ZAMM, the fourth in 1928 in the Swedish statistical and actuarial journal *Aktuarietidskrift*. The most influential of these four papers seems to have been the first one, which

number x with the difference 20. Square brackets enclose additions by the author RS of this article. Translations from German are by the author unless otherwise stated. Only previously unpublished passages will be quoted additionally also in German original.

⁹ These were short research papers, originally reserved for the staff at RvM's institute (ZAMM 2:306), but later also published in ZAMM by outsiders.

¹⁰ “Über starre Gliederungen von Fachwerken” (Ms. 1925) (Siegmond-Schultze 1993, 368).

appeared in ZAMM in 1927 in German under the title “On the structure of plane frameworks” (Geiringer 1927). In the recent book *Graphs and Geometry* (2019) by László Lovász one finds under “Stress-free and rigid graphs in the plane”:

“Whether a graph is generically rigid or stress-free is a purely combinatorial property, and one would like to obtain a purely combinatorial characterization of these properties. It is surprising that this basic question is only solved in the planar case, which we present here. ... The following important theorem, combining the results of Henneberg 1911, Pollaczek-Geiringer 1927 and Laman 1970 describes stress-free graphs in the plane.” (Lovász 2019, 269)¹¹

Indeed it was Geiringer’s premature generalization to the spatial case which had put her habilitation procedure in jeopardy.

Geiringer wrote about the realization of her statistical publication of 1928 (Geiringer 1928) and the habilitation secured by it in her “Mathematische Entwicklung” around 1970:

“The error was corrected by feverish work of Mises and the work was presented and accepted (in a very prestigious journal, the *Skandinavisk Aktuarietidskrift* 1928. At that time, papers that came from a good school were not evaluated by the editor of the journal) and my habilitation went through, but only for ‘applied mathematics.’” (Siegmond-Schultze 1993, 373/74)

This statement is also interesting because it points to the lack of peer-review practice for journal articles in the 1920s, which was also true of ZAMM. After 1930, Geiringer became particularly well known for her work in plasticity theory, which in many respects also ties in with RvM (Geiringer 1931).

Two other authors in ZAMM from RvM’s immediate Berlin environment were Gumbel and Bergmann.

The eminent statistician Emil Julius Gumbel (1891–1966), who was also associated with the statistician Ladislaus von Bortkiewicz (1868–1931) at the university’s Faculty of State Sciences by 1915 at the latest, was close to RvM and Geiringer from a professional point of view, especially in the theory of rare (extreme) events (Hertz 1997). Together with RvM and Hilda Geiringer and a few other authors, he covered the otherwise in ZAMM little represented field of probability theory and statistics in his contributions, among others by “Kurze Auszüge” (“Short Excerpts” = journal reviews) on statistics (ZAMM 2: 147–152). Gumbel also wrote two major articles, three “Short Communications” and 10 book reviews for the journal, mostly on statistical topics.¹²

Another early co-worker of RvM at ZAMM was Stefan Bergmann (1895–1977), who was born in Poland and earned his living mostly as an engineer in industry. Along with Hilda Geiringer and Lothar Collatz, he is undoubtedly RvM’s mathematically most important student, although he was less directly mathematically stimulated by him than the other two.

Bergmann’s doctoral dissertation (1921) under RvM and Erhard Schmidt (who contributed important ideas) which was published 1922 in *Mathematische Annalen*, contains the “Bergman kernel function” which is one of his major achievements in pure mathematics but has many potentials for applications. Bergmann published four original papers and two Short Communications in ZAMM which were of a more applied nature, including “Das Quadratwurzelziehen auf der Rechenmaschine” (Square root extraction on the calculating machine) (ZAMM 2: 316/17). Four book reviews were also published. In 1929 Bergmann published Short Excerpts from “Recent Polish work on mechanics” (ZAMM 9: 241–247).

RvM had Russian rocket engineer A.B. Schershevsky, who lived in Berlin and was associated with Hermann Oberth (1894–1989), report several times in his journal on Russian work on mechanics and applied mathematics.¹³ RvM had particularly close personal and scientific relations with Russia in general, which were probably also based on the traditionally lower separation between pure and applied mathematics there.¹⁴ As late as in June 1933 RvM reported in the following short obituary about another Russian “co-worker” at ZAMM:

“On May 30th in Leningrad our co-worker [Mitarbeiter] S. A. Gerschgorin, professor of theoretical mechanics at the Mechanical Engineering Institute in Leningrad, died at the age of 32. He was one of the most tal-

¹¹ I thank Jan P. Schäfermeyer (Berlin) for alerting me to the book (Lovász 2019).

¹² More remarks about probability and statistics in ZAMM see below Section 1.4.

¹³ ZAMM 7: 313–321, ZAMM 8: 143–149, ZAMM 11: 388–396.

¹⁴ RvM was a close friend of the prominent Russian physicist Leonid Mandelstam since his Strasbourg days. In August 1928 he participated with the founder of quantum mechanics, Max Born, and others in a large Russian physics congress in Kazan. Several of his books were translated into Russian.

ented and promising of the young Russian mathematicians working in the fields of applied mathematics and mechanics”. (ZAMM 13: 250)

Gerschgorin’s work in ZAMM of 1930 on “Error estimation for the difference method for solving partial differential equations”¹⁵ was extensively quoted and used in 1935 in the doctoral thesis by Lothar Collatz, the student of RvM.¹⁶

Co-workers without permanent academic positions such as Bergmann, Hencky, Ratzersdorfer and Scherschewsky were undoubtedly also motivated to work for ZAMM by smaller fees from the VDI-Verlag. The best information for the fees paid by ZAMM is contained in RvM’s correspondences with Ernst Weinel (1906–1979), and with Max Herzberger.¹⁷ In a letter dated October 31, 1931, apparently sent by RvM as a circular letter and addressed as “Dear Colleague”, it says on head sheets of ZAMM among other things:

“The increasing economic hardship in Germany, which hits the publication [Verlag]¹⁸ of our journal particularly hard, since it is very much dependent on advertising income, makes it increasingly difficult to maintain the ‘Zeitschrift für angewandte Mathematik und Mechanik’ on the same scale as before. In order to be able to get by with only an insignificant shortening of the text in the next few years, the publisher sees itself compelled to make a change in the fee conditions. As is the case with many mathematical and physical journals, the authors are to receive a certain number of copies of their work free of charge instead of the previous fee.”¹⁹

However, the economic situation at least at ZAMM (although certainly not in Germany as a whole) apparently soon eased again, because 1 year later, on November 8, 1932, RvM asked Max Herzberger in Jena whether he was willing to write either Short Excerpts or Summary Reports on geometrical optics for ZAMM, for which he could offer “fee in the moderate amount of 120 M” (“Honorar in der mäßigen Höhe von 120 M”) for 16 printed pages.²⁰

The Odessa-born engineer and doctoral student of RvM Isidore Malkin (1889-?) was probably also dependent on such additional income. In ZAMM he published, among other things, the detailed Short Excerpts “On some recent work in the field of elasticity theory” (ZAMM 10: 182–197). Already in his PhD thesis of 1924 Malkin had written:

“I am particularly indebted to Prof. Dr. R. v. Mises for promoting my studies by offering the possibility of their practical utilization [Verwertung] in industry.”²¹

RvM published in ZAMM five doctoral theses which had been under his supervision. Between 1921 and 1933, he was the main advisor at Berlin University for the following 13 doctoral students:²²

Stefan Bergmann (1921), Werner Fanta (1931), Hilde Heinicke (born Karselt, 1932), Paul Höflich (1927), Fritz Höhndorf (1926, ZAMM 6: 265–283), Werner Jenne (1928, ZAMM 8: 18–44), Werner Kochanowsky (1934), August Lauck (1925, ZAMM 5: 1–16), Hans-Joachim Luckert (1933), Isidor Malkin (1924), Fritz Rehbock (1926, ZAMM 6: 379–400), Curt Schmieden (1929, ZAMM 8: 460–479), Wilhelm Wenzel (1928).

¹⁵ “Fehlerabschätzung für das Differenzenverfahren zur Lösung partieller Differentialgleichungen” (ZAMM 10: 373–382)

¹⁶ Much later Collatz said in a different context: “The inclusion theorems for the characteristic numbers of matrices using the Gerschgorin circles became very well known.” (Collatz 1990, 281)

¹⁷ Herzberger Papers, National Library of Israel, Jerusalem. More about Herzberger’s relationship to RvM in the context of geometrical optics below in Section 1.4.

¹⁸ The translation of “Verlag” in the original German as “publishing house” would imply that a publisher for engineers (VDI) was particularly vulnerable which seems contradicted by the fact that the proposed measures were actually not imposed (see below).

¹⁹ “Die steigende wirtschaftliche Not in Deutschland, die den Verlag unserer Zeitschrift besonders schwer trifft, da er ganz wesentlich auf Inserateneinnahmen angewiesen ist, macht die Aufrechterhaltung der ‘Zeitschrift für angewandte Mathematik und Mechanik’ in dem bisherigen Umfang immer schwieriger. Um im nächsten Jahre mit einer nur unwesentlichen Verkürzung des Textes auskommen zu können, sieht sich der Verlag veranlasst, eine Änderung in den Honorarbedingungen eintreten zu lassen. Ähnlich wie es bei vielen mathematischen und physikalischen Zeitschriften der Fall ist, sollen die Verfasser anstelle des bisherigen Honorarbetrages eine bestimmte Anzahl von Abdrucken ihrer Arbeiten unberechnet erhalten.” Weinel Papers, Göttingen.

²⁰ 120 Mark corresponded to somewhat less than an average monthly wage of an industrial worker at the time.

²¹ Malkin’s thesis of 1924, “Zum dynamischen Verhalten rotierender, elastisch biegsamer Stäbe” (On the dynamic behaviour of rotating, elastically flexible rods), 127 pp) can be accessed through: edoc.hu-berlin.de. The quote is there p. 118: “Insbesondere verdanke ich Herrn Prof. Dr. R. v. Mises eine Förderung meiner Studien durch die Möglichkeit praktischer Verwertung derselben in der Industrie.”

²² In parentheses the year of the doctorate and the year number of ZAMM if the thesis was published there. Secondary reviewer was mostly Bieberbach, in some cases Max Planck. More detailed biographical information with titles of the theses can be found in the useful Dictionary (Tobies 2006).

If doctoral dissertations supervised by RvM were not published in ZAMM, there were not necessarily reasons of quality. The work of W. Fanta in numerics, for example, received the grade “opus valde laudabile”, that of Bergmann belonged more to pure mathematics. In the doctoral theses of Collatz (difference methods) and Lohan (plasticity theory), whose procedures were not completed until 1935, RvM was no longer an official reviewer, but had suggested the topic in each case. In Lohan’s case Hilda Geiringer had essentially taken over the unofficial supervision.²³

Besides Bergmann, of RvM’s doctoral students, only Malkin, Rehbock and Schmieden appeared in ZAMM with several other publications. Besides Hilda Geiringer as the only state-paid assistant, Rudolf Iglisch, Erich Rothe, Günter Schulz and Fritz Rehbock were at different times “assistants” of RvM at his institute. They were apparently paid privately by RvM or with industry money. Iglisch and Schmieden²⁴ also contributed to ZAMM’s 1953 birthday issue for RvM, while Rehbock wrote an obituary (Rehbock 1954). RvM’s doctoral student Collatz, contributed to both special issues for RvM in 1953 and 1983, Geiringer to the special issues of 1933 and 1953.

Several of RvM’s co-workers in the publication of ZAMM, several of his authors, and some of his Berlin assistants and students were expelled from Germany (or from Vienna in 1938 and Prague in 1939) in the years after 1933 as “Jews” (defined by the arbitrary Nazi term).²⁵ This concerned in particular Bergmann, Ernst and Werner Fanta, Frank, Geiringer, Gumbel,²⁶ M. Herzberger, von Kármán,²⁷ Walter Ledermann, Malkin, F. Pollaczek, Ratzersdorfer, H. Reissner, Rothe, W. Rüdberg. RvM tried to help several of them with expert opinions and recommendations for emigrant organizations. Many of them RvM has met again in American emigration. His older friend Kamillo Körner in Prague became a victim of the Holocaust.²⁸

1.2 | Collaboration with von Kármán in the major publication field of mechanics

The correspondence²⁹ between RvM and his friend and competitor Theodor von Kármán usually opened with “Dear Friend.” It was apparently the only Du-relationship RvM had with one of the board members of ZAMM, to whom von Kármán belonged from 1928.



FIGURE 4 Theodore von Kármán (public domain wikimedia commons)

²³ Thanks go to Ingo Althöfer (Jena) for this information.

²⁴ After much work in applications, Curt Schmieden (1905–1991) developed in the 1950s a non-standard analysis and thus contributed also to the foundations of pure mathematics.

²⁵ (Siegmond-Schultze 2009).

²⁶ He had already been forced to emigrate to France in 1932 by the nationalist members of his faculty in Heidelberg. Since his publications on German illegal right-wing militias, Gumbel had been an object of hatred among reactionary circles during the Weimar Republic and was admired by Einstein for his courage.

²⁷ He had been partially employed at Caltech in California since 1930 and was prevented from continuing to lecture at Aachen after 1933. (Hanle 1982)

²⁸ <http://www.holocaust.cz/de/opferdatenbank/opfer/100036-kamil-k-rner/>. (Last access June 2020). I thank Michael Plavec (Prague) for alerting me to these documents about Körner.

²⁹ The correspondence between von Kármán and RvM is quoted in the following after the Theodore von Kármán Papers in the Archives of the California Institute of Technology (Caltech). All letters quoted are there under 20.35-20.37.

With a header from ZAMM, RvM confirmed to von Kármán on July 13, 1921, the receipt of four hydrodynamic manuscripts, all of which were published as soon as in August 1921 in issue 4 of the first volume of ZAMM.³⁰ Especially the works by von Kármán himself and by Karl Pohlhausen (1890–1980) were groundbreaking for the calculation of Prandtl’s boundary layer (Millsaps 1984). The leading historian for these topics, Michael Eckert, writes, partly quoting von Kármán’s paper:

“Kármán’s paper, ‘On laminar and turbulent friction,’ ... was a larger attempt ‘to present the basic idea of Prandtl’s boundary layer theory as simply as possible both from a mathematical and a physical point of view.’ Kármán’s declared goal was to render the boundary layer theory amenable for solving ‘complicated problems with simple mathematical means’ [ZAMM 1: 233]. By integrating over the thickness of the boundary layer, he derived an equation of the incoming and outgoing momentum – a procedure Prandtl’s student Karl Pohlhausen had just applied in his doctoral dissertation.” (Eckert 2006, 120)

RvM wrote to von Kármán that the corrections should be completed within 3 days and that bad experiences with a manuscript of Erich Trefftz had led him to always have manuscripts put in reserve in the future. He added by hand: “When correcting, please consider my remarks in the margins.”³¹ On August 3, 1921, von Kármán then informed RvM that the correction (page proofs) of his own article had been read by Prandtl and that the latter had several requests for changes.

Thus, using the example of the important work (Kármán 1921), the collaboration of the three great aerodynamicists Prandtl, von Kármán and RvM with each other and with a promising student (Karl Pohlhausen) can be followed in detail. Not only the editorial contribution but also RvM’s achievement in terms of content was acknowledged when von Kármán wrote in a footnote of his publication, referring to RvM’s book of 1914:

“The only resistance formula to date that takes into account the two decisive variables, relative roughness and Reynolds’ number, is that of R. v. Mises, *Elemente der technischen Hydromechanik*, Leipzig 1914, p. 50 ff.” (Kármán 1921, 237)

On November 28, 1921, RvM thanked von Kármán for his review of the eighth edition (1920) of the classic book “Elasticity and Strength” by Carl von Bach (1847–1931), but asked for an addition, because the “view of the buckling process there is completely untenable.” Kármán conceded in his reply letter of December 10, 1921:

“I have supplemented Bach’s discussion of the buckling question. It has escaped my notice that it is indeed treated very strangely.”³²

Von Kármán’s review was finally published with a misprint – rare for ZAMM – under the heading “Electricity and Strength.” Regarding the passage complained of by RvM it says:

“The treatment of the buckling problem is by no means adequate. There is no connection to the classical theory of elasticity (consideration of finite curvature), which is required to make the whole situation conceptually clear, and the theory of buckling beyond the limit of proportionality, which is completely secured today, is also missing.” (ZAMM 1: 486)

In other contexts too, von Kármán recognized RvM’s broad technical and mathematical competence in his correspondence with him. On March 26, 1926 von Kármán sent RvM a manuscript by C. Vajda “Slipping of the rolling wheel” (“Schlüpfung des rollenden Rades“). Kármán said he was not familiar with the subject, but, judging from RvM’s article in Felix Klein’s Encyclopedia, he assumed that he was competent. RvM wrote in his reply on April 26:

³⁰ These were (Kármán 1921) and (Pohlhausen 1921) on laminar boundary layers, and papers by Hans Latzko and by Ludwig Hopf/Erich Trefftz.

³¹ “Bei der Korrektur bitte ich, meine Randbemerkungen in Erwägung zu ziehen.” Kármán Papers, 20.35.

³² “Die Besprechung Bach habe ich bezüglich der Knickungsfrage ergänzt. Es ist mir entgangen, dass diese tatsächlich sehr merkwürdig behandelt wird.” (Kármán Papers, 20.35)

“The Short Communication [Kleine Mitteilung] of Mr. Vajda about the rolling wheel is not quite understandable to me. I can’t very well commit myself to publish it, because I am not convinced that it is in accordance with the basic laws of mechanics.”³³

RvM’s British doctoral student (1951) in American emigration, Geoffrey Ludford (1928–1987), later went so far as to suggest that RvM’s versatility in mechanics might appear to today’s mechanicians as a sign of dilettantism:

“The brief encounters with different areas of mechanics will lead some to call him a dilettante. If he was, then we need more dilettantes to ask the basic questions and give the seminal answers. The accusation shows inter alia a misunderstanding of his applied mathematics, which was not so much a subject as a method, in fact the scientific method for a subject that has reached a certain level of sophistication.” (Ludford 1983, 282)

One can probably say that von Kármán was not a dilettante in the sense of this statement, and as a scientist he was more specialized and therefore in a way more modern than RvM. To a certain extent, and as a condition and flip side for this specialization, both von Kármán and Prandtl were less than RvM willing to take on organizational tasks such as the publication of ZAMM.³⁴

Von Kármán was at that time anyway almost on his way to American exile, not unaffected by experiences with academic anti-Semitism (Hanle 1982, 122). He wrote to RvM on August 25, 1926 that he had been invited to Pasadena by the American physicist Robert Millikan, “which is quite pleasant considering the beautiful surroundings and stimulating company.”³⁵ In the same letter, von Kármán announced two doctoral theses for possible publication in ZAMM, including Max Knein on stress distribution in a body under pressure (“Spannungsverteilung in einem Druckkörper”). About Knein’s work von Kármán said the following, expressing that he felt that his institute in Aachen was in competition with the closely connected Prandtl institute in Göttingen:

“Since I hear similar things are being done in Göttingen, I want to have the results published quickly.”³⁶

Part of Knein’s work has, at von Kármán’s request, been published as a Short Communication under the title “On the theory of the compression test” (Zur Theorie des Druckversuchs) (ZAMM 6: 414–416), the complete doctoral thesis does not appear to have been published in ZAMM.

Another example where RvM’s competence ultimately was decisive is a manuscript on plasticity theory submitted to him by von Kármán on November 28, 1927. Von Kármán wrote:

“Enclosed paper was sent to me by a Mr. Andreas Reuss, Budapest. Frankly speaking, I cannot judge whether the matter has any significance. Since the work is related to your work, I am sending you the same. The address of the gentleman is on the manuscript. Perhaps you could write him a few lines on whether the matter is correct and of value.”³⁷

It is interesting to note that the Hungarian engineer András (sometimes Endre) Reuss (1900–1968), who was to attract attention in the following years with his publications on plasticity theory in ZAMM (Bruhns 2014) and who had probably considered his fellow countryman von Kármán as the natural addressee for his manuscript, was not known to

³³ “Die Kleine Mitteilung von Hrn. Vajda über das rollende Rad [ist mir] nicht recht verständlich. Ich kann mich nicht gut darauf einlassen, sie zu publizieren, da ich nicht die Überzeugung habe, dass sie mit den Grundgesetzen der Mechanik in Einklang steht.” RvM to von Kármán, April 26, 1926, Kármán Papers, 20.36.

³⁴ Von Kármán apologized to RvM in their correspondence on several occasions for a lack of commitment, including at GAMM, where RvM was managing director. Prandtl’s unwillingness to take over ZAMM after RvM’s emigration can be seen in RvM’s letter to Trefftz in October 1933 (Appendix).

³⁵ “was ganz angenehm ist in Anbetracht der schönen Gegend und der anregenden Gesellschaft.” von Kármán to RvM, August 25, 1926, Kármán Papers, 20.36.

³⁶ “Da, wie ich höre, in Göttingen Ähnliches gemacht wird, möchte ich die Resultate rasch publizieren lassen.” von Kármán to RvM, August 25, 1926, Kármán Papers, 20.36.

³⁷ “Beiliegende Arbeit wurde mir von einem Herrn Andreas Reuss, Budapest, zugeschickt. Aufrichtig gesagt, kann ich nicht beurteilen, ob die Sache eine Bedeutung hat. Da die Arbeit sich indessen an Deine Arbeiten anschließt, sende ich Dir dieselbe ein. Die Adresse des Herrn steht auf dem Manuskript. Vielleicht schreibst Du ihm einige Zeilen, ob die Sache richtig und von Wert ist.” von Kármán to RvM, November 28, 1927, Kármán Papers, 20.36.

the latter or to RvM at that time. As RvM said in a letter to von Kármán on December 6, 1927, he had written to Reuss, telling him that he had made analogous considerations for single crystals (Einkristalle) “quite some time ago.” RvM further wrote in this letter to Reuss of the same day, which he enclosed as a carbon copy in the letter to von Kármán:

“I will probably publish something about it soon. Then, if you further elaborate on your idea of treating polycrystals, I would be happy to publish it in the journal.”³⁸

This led to RvM’s 1928 publication “Mechanics of plastic deformation of crystals” (Mises 1928a) where RvM restricted himself to single crystals. Reuss’ work did not appear revised until 2 years after its submission (Reuss 1929). The episode about the delay of Reuss’ publication may give evidence to the fact that the work as editor of scientific journals had ethical dimensions then as now. However, this is not intended to place the important work of RvM, which goes beyond Reuss’ results, under suspicion of plagiarism.³⁹

Even more important than the 1927/29 work was to become Reuss’ ZAMM article of 1930 (Reuss 1930) which was a generalization of the Lévy – von Mises equations of plasticity. Here, Reuss made allowance for the elastic component of strain, following an earlier suggestion by Prandtl. Bruhns writes:

“Apparently independent from a work by Prandtl [talk at the 1924 Mechanics Congress in Delft], where already elastic deformations have been considered in a plane problem, the Hungarian András (Endre) Reuss ... in 1930 connected the de Saint-Venant/Lévy approach with the description of an (incremental) elastic behavior. For this purpose, like Hencky, he emanated from the v. Mises yield condition [1913].”⁴⁰

RvM’s collaboration with von Kármán also extended to science policy matters around ZAMM and around the Society for Applied Mathematics and Mechanics (GAMM), founded in 1922,⁴¹ some of which are discussed below. The collaboration was also continued in American emigration.⁴²

1.3 | RvMs’ scientific publications in ZAMM and the “Übersicht” (Overview) of 1940 over his work

In this section, I give an overview of RvM’s own scientific publications in his journal ZAMM, the number of which exceeded the contributions of all other authors.⁴³ The main source is the “Overview of Treatises” (“Übersicht der Abhandlungen”) (Mises 1940), an unfinished manuscript of 9 printed pages written in German around 1940 in American emigration, which RvM’s widow Hilda Geiringer included in 1963 in the first volume of his *Selecta* (Mises 1963/64). Only those passages in English translation that refer to publications in ZAMM are quoted here. In the “Overview” RvM divided his work into nine fields of publication (see figure below) and referred in detail to the list of 145 publications,⁴⁴ which he himself carefully kept and numbered. Hilda Geiringer added five of RvM’s Short Communications (Kleine Mitteilungen) in ZAMM which she considered essential and which RvM had not included in his bibliography. RvM has published a total of eight such “Kleine Mitteilungen.”⁴⁵

³⁸ “Wahrscheinlich werde ich demnächst etwas darüber veröffentlichen. Wenn Sie dann Ihren Gedanken der Behandlung von Mischkristallen weiter ausführen, so würde ich mich freuen, dies in der Zeitschrift publizieren zu können.” RvM to Reuss, copy attached to the letter by RvM to von Kármán, December 6, 1927, Kármán Papers, 20.36.

³⁹ RvM refers in a footnote (Mises 1928a, 171) to Reuss’ manuscript and to results contained therein which Reuss had found independently of RvM. More about RvM’s view on his own work in plasticity theory is given in the following Section 1.3.

⁴⁰ (Bruhns 2014, 189). See also (Osakada 2010, 1440).

⁴¹ See (Gericke 1972) and (Tobies 1982).

⁴² The two would edit the book series “Advances in Applied Mechanics” with Academic Press in New York from 1948. See also 3.1.

⁴³ This does not yet include the non-scientific contributions of RvM. See Sections 1.5 and 1.6.

⁴⁴ (Mises 1964). In the following selected quotations from (Mises 1940), I have replaced the numbers of the bibliography used by him in each case by the reference to ZAMM or, if necessary, to the more precise bibliographical reference.

⁴⁵ (Mises 1963/64, vol. II, 564).

Von Mises' field of publ. following his designation	ZAMM until 1940	Everywhere (including books) until 1940
I. Geometry (Statics, vectors, geometrical optics)	2	10
II. Dynamics	0	4
III. Elasticity and Strength	6	13
IV. Hydromechanics	2	14
V. Aviation	1	11
VI. Probability and Statistics	2	35
VII. Practical Analysis	2	7
VIII. General and Philosophy	2	8
IX. Biographical	1	5
Total number of Publications	18	107 of 145 in RvM's total bibliography

FIGURE 5 R.v. Mises' publications until 1940 according to (Mises 1940), divided into ZAMM and "everywhere" (without "Short Communications")

The figure shows that RvM published by far the most papers (35) in area VI. Probability and Statistics,⁴⁶ his favorite mathematical field (Cramér 1953), followed in roughly equal parts by 13 in III Elasticity and Strength and 14 in IV Hydromechanics. With regard to his publications in ZAMM, the situation is just the opposite, with clear dominance for III Elasticity and Strength. Enclosed in the Overview are also three publications in ZAMM from areas VIII and IX which are not directly related to specialized research, including RvM's introductory article (Mises 1921) and his article on Felix Klein's 75th birthday (ZAMM 4: 86–92). Only two of the 18 publications in ZAMM were published after RvM's emigration (1933) and before 1940. Another (Mises 1954) has been published posthumously in ZAMM. Ten of the 18 publications (including two from the general and philosophical field VIII) RvM's widow Hilda Geiringer considered important enough to be reprinted in the *Selecta* of 1963/64 or she hoped that a renewed publication would preserve underestimated thoughts of her husband and teacher.

The unfinished manuscript (Mises 1940) contains evaluations by RvM about his own work only for the first three fields of publication and for parts of the fourth. In total, RvM comments only on eight of his publications in ZAMM, all of which belong to areas I and III. Therefore, in the following I will only quote those comments of RvM in his "overview" that belong to these two areas.

Of course, RvM's work requires a much more detailed analysis than can be done here. Since RvM's view on his own work is necessarily subjective and did not come very long after the publications, I have used scattered assessments of other mathematicians and mechanicians (Collatz, Schäfermeyer, Wohlhart) as additional sources.

About his two works in ZAMM 1924, which are devoted to his "Motor Calculus" (Motorrechnung)⁴⁷ and which he classifies under "I. Geometry (Statics, Vector Theory, Geometrical Optics)", RvM remarks in his Overview in 1940:

"In the comprehensive treatise ... following the geometrical concept of the 'Motor' (= dynam, screw [Schraube]) created by E. Study, a new 'motor calculus' is developed, which takes its place alongside the three-dimensional vector and tensor calculus. The new definitions of the motor products and the motor tensor make it possible to treat all tasks of spatial statics, kinematics and dynamics in a form in which no coordinate system, not even the starting point [Anfangspunkt] of one (reference point of moments), is used. The new calculus also proves fruitful in its application to certain questions of elasticity theory (general frameworks) and hydrodynamics (rigid bodies in fluids). ... The main results have been included in some [einzelnen] textbooks and supplemented by some Russian authors." (Mises 1940, xvi)

In 1969, there was a correspondence between Walter Humbach, professor at the Institute for Reactor Technology in Darmstadt, and Hilda Geiringer in Cambridge/Boston about this. Humbach wrote on February 7, 1969:

"For several years I have been repeatedly preoccupied with the motor calculus developed by your late husband on the basis of the work of Klein and Study, with which I became acquainted – albeit only in hints and without realizing the implications – already in 1939 at the beginning of my studies in a mechanics lecture. ... I don't

⁴⁶ I will discuss this briefly in Section 1.4.

⁴⁷ (ZAMM 4: 155-181, 193-213)

really understand why this has not been further developed, not even by the specialists directly concerned. The only deeper explanation for this seems to me to be that your husband here – as in many other places of theoretical physics – was far ahead of his time and simply for this reason could not find any understanding.”⁴⁸

Geiringer replied on the 11th of the same month:

“Of course I know my husband’s work on the motor calculus very well. I think, like you, that they have not received enough attention. But that’s the case with a lot of Mises’ work.”⁴⁹

In the 1990s a mechanics professor from the Austrian Technical University of Graz found the *Motorrechnung* of his former country man worth another trial – after introducing “consistent notation” – and wrote in the abstract of the paper (Wohlhart 1995):

“This paper reviews the motor calculus as it was presented by Richard von Mises and extends it to a general motor tensor calculus on the basis of unit motors. R. v. Mises defined a scalar and a motorial product of two motors without using Clifford’s duality unit ε ($\varepsilon^2 = 0$) and introduced motor dyads. . . . A consistent notation for motor and motor dyads, which are used in the forthcoming English translation of v. Mises’ motor calculus, facilitates the algebra.” (Wohlhart 1995, 93)

Wohlhart, who considers the “*Motorrechnung*” as an example of Mach’s “economy of thought” (Wohlhart 1995, 94), produced a translation of RvM’s two papers in ZAMM under the title “Motor Calculus: A New Theoretical Device for Mechanics (Richard von Mises, E. J. Baker, K. Wohlhart, Institute for Mechanics, University of Technology, undated after 1995, 72 pages)”⁵⁰

Within his comments for the publication field III. (Theory of Elasticity and Strength) RvM first has remarks about a Marburg lecture, published as “About the stability problems of elasticity theory” (Mises 1923a):

“Interest in the stability problems of elasticity theory continued unabated throughout time. In 1923 it led to the discovery of the stability limits within the classical theory of trusses [Fachwerke] – astonishing enough that these were not already known long ago, given the great practical importance of many individual cases. The treatise. . . contains, in addition to the theory of ‘pure’ truss buckling [Fachwerkknickung] and ‘frame buckling’ [Rahmenknickung], a much more comprehensive approach which includes all types of connections of originally straight, elastic rods [Stäbe]. However, this theory is only applied to the case of two dimensions.”⁵¹

RvM then discusses the two papers written jointly with Ratzersdorfer in ZAMM [Mises/Ratzersdorfer 1925/1926] on the buckling safety of trusses which connect to this publication of 1923:

“More detailed information on the special problem of trusses as well as on general arbitrary bar connections can be found in the two publications [1925] and [1926], the final editing of which was carried out by J. Ratzersdorfer on the basis of a draft I had written. In [(Mises 1923a), see above], however, several fundamental questions of stability theory were also touched upon – in a certain programmatic form – which seemed to me to be very important and still seem to be so, such as the question of Kirchhoff’s uniqueness theorem [of 1859, RS] and the definitive characterization of the various load cases as unstable and stable, etc. The envisaged detailed elaboration of these questions did not come about any more, mainly probably due to increasing

⁴⁸ “Seit mehreren Jahren beschäftigt mich immer wieder die von Ihrem verstorbenen Gatten auf der Grundlage der Arbeiten von Klein und Study entwickelte *Motorrechnung*, mit der ich – allerdings nur andeutungsweise und ohne die Tragweite zu erkennen – bereits 1939 zu Beginn meines Studiums in einer Mechanik-Vorlesung bekannt geworden bin. . . . Ich verstehe eigentlich nicht recht, warum sie nicht einmal in der unmittelbar betroffenen Fachwelt weiterentwickelt worden ist. Die einzige tiefergehende Erklärung hierfür scheint mir zu sein, dass Ihr Mann hier – wie ja auch sonst an vielen Stellen der theoretischen Physik – seiner Zeit weit voraus war und einfach deshalb kein Verständnis finden konnte.” Von Mises Papers, HUG 4574.105, box 8, folder: personal (1968–1973).

⁴⁹ “Natürlich kenne ich die Arbeiten über *Motorrechnung* meines Mannes sehr gut. Ich finde, gleich Ihnen, dass sie nicht genug beachtet worden sind. Das ist aber bei sehr vielen der Arbeiten Mises’ der Fall.” (ibid.)

⁵⁰ I am grateful to K. Wohlhart for sending me a copy of the brochure which was apparently printed by his students.

⁵¹ (Mises 1940, xxi). In a footnote RvM refers here to the doctoral thesis of his student W. Wenzl, also published in ZAMM in 1928, for an “extension to three-dimensional problems.”

distraction by the occupation with other things. Some of this is communicated in the beautiful book by J. Ratzersdorfer.”⁵²

These two works (Mises/Ratzersdorfer 1925/26) have been honored in a book that has been published in several editions, where the authors also use the term “Mises truss” throughout:

“The flexibility coefficients were introduced in stability analysis of frames by von Mises and Ratzersdorfer (1926).”⁵³

A work by RvM in ZAMM on plasticity theory (Mises 1928a) has already been briefly discussed above in connection with von Kármán’s mediation of a work by Reuss. RvM himself writes in his “Overview” with reference to several works by himself and by Hencky which were published in ZAMM:

“The study of the basic equations of the mechanics of plastically deformable bodies goes back to the Brünn period (1906–1909). Outwardly prompted by the somewhat fantastic approach of Haar and v. Kármán, I [(Mises 1913)] tried to establish a system of equations which, within the framework provided by classical mechanics, is determined by common facts of experience. Later it was found that M. Lévy had given a similar approach in an unnoticed work of 1871, with a different justification and without the decisive addition of the ‘plasticity condition’.⁵⁴ My condition of plasticity later proved to be in best agreement with the observations and it is still often used today.

When in 1923 Hencky had found the beautiful differential geometric properties of the stress lines in the two-dimensional case of plastic deformation [(Hencky 1923) in ZAMM], I was able to take the theory for this case much further. In [(Mises 1925a)] the differential equation of streamlines of plane deformation of the plastic body is given for the first time, as well as a number of examples and general theorems.⁵⁵ In these two works it was exclusively about the isotropic plastic body. In the meantime, various experiments had been carried out on the flow of single crystals and this gave rise to the larger theoretical investigation [(Mises 1928a)] which was published in 1928. Here the most general forms of the plasticity condition are discussed, which correspond to the invariance conditions of the different crystal systems. Two types stand out in particular, the shear stress condition corresponding to Mohr’s⁵⁶ theory and the generalization of my approach for the isotropic case. The main result of the work is the introduction of the term flow potential [Fließpotential, today mostly “yield potential,” RS] which establishes a relationship between the yield condition [here RvM uses “Fließbedingung,” instead like before “Plastizitätsbedingung,” RS] and the deformation laws. I also attach importance to the clarification of the term ‘internal slip’ [innere Gleitung], which is much used by experimenters but never sufficiently defined. The results of this work were later often used in connection with experimental investigations, but do not seem to me to have been sufficiently exhausted.” (Mises 1940, xix/xx)

It is interesting that RvM does not mention here that his “plasticity condition” (yield criterion) for the transition from the elastic to the plastic state (Mises 1913), which is probably best known and most frequently used today, was largely published as early as 1904 by the Pole Maksymilian Tytus Huber (1872–1950); however, in Polish and thus inaccessible to RvM and Hencky. This is discussed by Bruhns in his commentary on another work by Hencky in ZAMM from 1924 (Bruhns 2020).

Knowing RvM’s ambition and hyperresponsiveness, and his willingness to enter into dialogue with the authors of ZAMM, it seems to me beyond doubt that RvM overlooked the mention of Huber’s priority in the corrections (proofs)

⁵² (Mises 1940, xxi). The editor Geiringer of RvM’s *Selecta* adds here the title of the book J. Ratzersdorfer, *Die Knicksicherheit von Stäben und Stabwerken*, Vienna, Springer 1936.

⁵³ (Bažant /Cedolin 2010, 56). See also (Frantik 2007).

⁵⁴ Today often called the “Mises yield criterion.”

⁵⁵ At this point, RvM or Geiringer as editor, without giving exact details, remarked: “Further explanations are contained in the dissertation of W. Jenne (also for the three-dimensional case) [ZAMM 8: 18-44], then the work of H. Geiringer (published in the Stockholm Congress Report) [(Geiringer 1931)], finally the dissertation of R. Lohan.” The latter is the above mentioned dissertation by Lohan in Berlin (1935), which was mainly supervised by Geiringer.

⁵⁶ The German engineer Christian Otto Mohr (1835–1918).

of [Hencky 1924/2020, 4], where it was inserted by Hencky at the last minute.⁵⁷ RvM used the first opportunity in ZAMM, namely a 1926 publication by F. Schleicher, where Huber is also mentioned, to suggest in a “Note from the Editor” (ZAMM 6: 199) the differences between his and Huber’s “plasticity conditions.” In his 1928 work mentioned in the “Overview” RvM goes into more detail:

“Especially for the pure tensile tests that are mainly considered in the following, Huber’s point of view would lead to completely different results. Recently, one often finds confusion between my 1913 yield condition and Huber’s condition.” (Mises 1928a, 170)

Huber himself later published in German in ZAMM and drew attention to his early Polish publications in another field.⁵⁸ As far as the condition of plasticity is concerned, we follow Bruhns:

“In recognition of the contributions of the three persons Huber, v. Mises and Hencky to its present form, we should call this condition HMH-yield condition.”⁵⁹

Finally some remarks about RvM’s articles in ZAMM which are listed but not discussed in his 1940 Overview.

RvM’s contribution to Prandtl’s boundary layer in hydrodynamics (Mises 1927) which contains the “von Mises Transformation,” has been mentioned in [RS-Mises 2020, 19] and (Siegmond-Schultze 2018).

Under “V. Aviation” [Aviatik] RvM listed his contribution “The navigation problem of aviation” (Mises 1931b). Here RvM confirmed results from an article in the same volume (ZAMM 11: 114–124), published by Ernst Zermelo (1871–1953), who was most known for his work in the foundations of mathematics. While Zermelo had used the variational calculus to solve the question of moving with constant speed from one point to another under air resistance in the shortest time, von Mises used more elementary methods borrowed from geometrical optics (Ebbinghaus 2007, 150–152).

Some of the particularly influential among RvM’s overall not very numerous papers in numerical analysis have been published in ZAMM. His student Collatz honored them in 1983 in ZAMM’s special issue for RvM’s one hundredth birthday. About a Short Communication of RvM in ZAMM of 1924 Collatz wrote:

“In his numerous works on mechanics, he very often uses numerical methods and calculates, for example, the non-linear problem of buckling a rod [(Mises 1924)], whereby he also gains the branches of the branching diagram belonging to higher eigenvalues and is far ahead of his time.” (Collatz 1983, 279)

In connection with RvM’s 1930 work on the Adams difference method (Mises 1930), which has been discussed in [RS-Mises-2020, 13], Collatz said in the same article:

“Now it is typical of RvM not to be satisfied with good numerical results, but to carry out a precise error analysis, to examine the ‘quadrature error’ and its influence on the further calculation (ZAMM 10 (1930), 81–92).” (Collatz 1983, 278).

On RvM’s last paper in ZAMM (Mises 1954) which appeared posthumously in 1954, Collatz wrote in the commemorative article for his teacher in 1983:

“There has been extensive literature for centuries on approximate calculation of integrals, e.g. Kepler’s barrel rule, trapezoidal rule, Gaussian quadrature and many others. From time to time, von Mises turned his attention to the task of establishing a uniform theory of quadrature and cubature formulae and estimating their errors (1953, 1936). In the work ZAMM 34 (1954), 201–210 he examines the numerical calculation of multidimensional integrals. These error estimates also had a stimulating effect in the following period, and many generalizations were made (J. Albrecht et al.).” (Collatz 1983, 279)

⁵⁷ In April 1924 the International Congress of Mechanics was held in Delft (Netherlands) where Huber mentioned his 1904 work in the discussion to Hencky’s lecture. It is clear from the Proceedings that RvM did not take part in this discussion, since at the same time on April 26, 1924 he was head of the section “Rational Mechanics”, where he lectured on his “Motor Calculus” (Biezeno/Burgers 1925, xv).

⁵⁸ Bending of plates (ZAMM 6: 228–231).

⁵⁹ (Bruhns 2020, 6). In 1984 (Rychlewski 2011, 31) drew attention to an even earlier formulation of the yield condition by Lord Kelvin. Thanks to Holm Altenbach for this information.

Collatz also referred to the two-part joint work with Geiringer, published in ZAMM in 1929, which is based on lectures by RvM (Mises/Pollaczek-Geiringer 1929):

“In two fundamental works, ‘Practical methods for solving equations’ (ZAMM 9 (1929), 58–77, 152–164), Mises and his student Hilda Pollaczek-Geiringer (his later wife) gave a well-rounded theory with convergence proof and error estimation for iteration procedures to obtain approximate solutions.” (Collatz 1983, 278)

About this work, which appeared in ZAMM under “Summary Reports” and which RvM himself included in his above-mentioned bibliography of original publications, Collatz later also said:

“He also did not shy away from doing extensive numerical calculations himself. The ‘v. Mises method’ for the iterative determination of the eigenvalues of matrices was developed by him.” (Collatz 1990, 281)

Modern numerical analysts wrote recently in 2018:

“Chaim Müntz presented [1913] both the power method and the inverse power method for the symmetric and nonsymmetric matrix eigenvalue problem, as well as for the generalized eigenvalue problem with symmetric matrices. ... In modern textbooks it is known as orthogonal or subspace iteration and can be shown to be equivalent to the basic QR algorithm ... Although it was presented in von Mises’s 1929 survey paper [(Mises/Pollaczek-Geiringer 1929), part II], the method is far too tedious for hand computation and was taken up again with the availability of computers in the 1960s.” (Tapia/Dennis/Schäfermeyer 2018, 8/9)

1.4 | Minor fields in ZAMM: Probability and statistic, geometrical optics

As was to be expected after the emphasis on mechanics in RvM’s “Tasks and goals” (Mises 1921), which was discussed in [RS-Mises-2020, 11–16], works on probability theory and statistics, both by him and by other authors, played only a marginal role in ZAMM. However, there are three exceptions.

As noted above, RvM’s co-worker at ZAMM Gumbel was at the same time closely associated with Ladislaus von Bortkiewicz. RvM held the latter, his colleague from the state science faculty of Berlin University in high esteem. Close collaboration between the two is not documented, but RvM’s important work published outside ZAMM on rare events and extreme value distributions was influenced by Bortkiewicz (Mises 1923b). In 1931 RvM dedicated a short obituary to his colleague in ZAMM, referring to the publication (Bortkiewicz 1922). The obituary is noteworthy especially because of the clear recognition of Bortkiewicz’s leading role in mathematical statistics in Germany, at a time when much of economic statistics still remained of a descriptive kind:

“On July 16, Mr. Ladislaus v. Bortkiewicz, professor of mathematical statistics and economics at the University of Berlin, died of a heart attack. He was the most important researcher in the field of mathematical statistics in Germany, and was known far beyond its borders for his work. Our journal owes him an article dealing with an interesting question of error theory, which was published in the second volume.” (ZAMM 11: 340)

As for the second exception: In his book of 1928 RvM commented particularly positively (Mises 1928b, 109/186) on the theory of chained events (verkettete Ereignisse) as developed by Georg Pólya together with a practical statistician, and published in ZAMM (Eggenberger/Pólya 1923). This is today known as the “Pólya-Eggenberger urn scheme” and is counted among the most important of Pólya’s probabilistic work (Chung 1987). The coming about of this publication is also an example of RvM’s constructive collaboration with authors, which in this case led to the change of title. He wrote to Pólya on December 15, 1922 among others:

“Dear Colleague.

With best thanks I confirm the receipt of your Ms. ‘About the increase of chances by success.’ [‘Über die Chancenvermehrung durch Erfolg’]. I will gladly publish the work in one of the next issues. You will allow me to change the language in some places. ... As to the title I would suggest saying something like, ‘On

the statistics of chained processes' [‘Über die Statistik verketteter Vorgänge’] which I would also like to see because it sounds more ‘applied’.”⁶⁰

The third exception of influential work on probability theory on the pages of ZAMM is the special issue dedicated to RvM’s 50th birthday in 1933. Here one can find an important work by J. Hadamard and M. Fréchet on Markov chains and a work by Geiringer on statistical correlation, which RvM rated very positively (see below).

RvM’s own publications on probability theory and statistics were mainly published outside ZAMM and increasingly since the 1930s. The two publications in ZAMM’s first volume (1921) are probably to be regarded more as an echo of his fundamental work of 1919 and 1920. They are not among his most important in this field. However, RvM constantly lectured on his favorite mathematical field and encouraged his colleagues and students such as Geiringer (habilitation 1927), Gumbel and Schulz to publish on this topic in ZAMM as well. In 1928, RvM published his semi-popular book on probability and statistics (Mises 1928b), mentioned above, which went through several German and English editions and is still sold today. It is also noteworthy that RvM in 1931 – still in full activity as editor of ZAMM – chose just the theory of probability and its applications as subject for the first volume of a future book series on applied mathematics, which was never continued due to his emigration in 1931 (Mises 1931a).

The fact that the above mentioned second part of Geiringer’s habilitation thesis was not published in ZAMM is also related to the marginal position of mathematical statistics in Germany as a whole and in ZAMM in particular. In 1932 Geiringer wrote in ZAMM, certainly with the approval of RvM, in a review of the German translation of an American Handbook of Statistics (H. L. Rietz) which had been published with an introduction by RvM:

“Compared to other countries, the cultivation of mathematical statistics in our country is rather poor: just think of Scandinavia with its interesting and leading ‘Aktuarietidskrift’ and of Pearson’s inexhaustible English ‘Biometrika.’” (ZAMM 12: 126)

After 1933, no longer involved in ZAMM and in the context of theoretical and practical mechanics flourishing in Germany, RvM published his most important work in the field of probability theory and mathematical statistics during the Turkish emigration and confirmed his position as an international leader in these two fields.

Another minor field in ZAMM was mathematical optics, which was essentially represented there since the late 1920s by Max Herzberger (1899–1982).⁶¹ Herzberger, who was an industrial mathematician at Zeiss in Jena at the time, had received his doctorate from the University of Berlin in 1923 with an algebraic thesis under Issai Schur and at that time apparently had little interest in applications and little contact with RvM.

The latter had not mentioned geometrical optics in his “Tasks and Goals” in ZAMM (Mises 1921). In an exchange of letters RvM advised Herzberger several times scientifically and also personally regarding his professional activities. On October 11, 1929, RvM recommended, among other things,

“working with line coordinates instead of vectors or, what is even better, using the Study dual numbers or my motor calculus.”⁶²

Herzberger wanted to gain a foothold at the university in Jena as well, in addition to his industrial work. He tried to submit his twenty-page article “About the vicinity of a ray in optical systems” (“Über die Umgebung eines Strahls in optischen Systemen”) (ZAMM 10: 476–486) as a habilitation thesis. In a letter to RvM on October 2, 1930 Herzberger, who was later expelled from Germany as a “Jew”, reported on the failure of his academic aspirations due to the early role of the Nazis in the regional government⁶³ and anti-Semitism also at the university. RvM tried to help him also later during emigration. Although Herzberger had not quite followed his advice for using the motor calculus, RvM provided him with an expert opinion written 1934 in Turkish emigration RvM, after Herzberger had also been dismissed from his industrial position at Zeiss:

⁶⁰ (Siegmond-Schultze 2006, 510/11). The letter is reproduced there in German in more detail. On page 511 of the same publication there is also a letter from RvM to Pólya from July 16, 1925 with the proposal to jointly found a journal for mathematical statistics. Nothing has come of this project.

⁶¹ ZAMM 8: 396-402, ZAMM 9: 505-506, ZAMM 10: 467-486.

⁶² Herzberger Papers in the National Library of Israel in Jerusalem.

⁶³ The “old fighter” (alter Kämpfer) of the NSDAP and later Reich Minister of the Interior Wilhelm Frick had become Minister of Education in the German state of Thuringia. Frick was executed in Nuremberg in 1946 as one of the main war criminals.

“Dr. Herzberger has succeeded in achieving many remarkable new results by going into the line geometric principles of optics, which deserve great interest both from a theoretical point of view and for applications in industrial optics. It is no exaggeration to say that Herzberger’s work opened up a new fruitful period of research in the field of geometric optics.”⁶⁴

RvM himself did not publish in ZAMM explicitly on geometrical optics, but he used methods from it in his paper [Mises 1931b] as mentioned above.

1.5 | The various roles of RvM as reviewer in ZAMM

In the old ZAMM until 1944, an average of three pages with book reviews in two columns and smaller print appeared in almost every issue. They often contain no more than a few lines, but principally no more than one printed page, with the longer reviews generally reserved for larger collections. This amounts to about 600 reviews for the 13 volumes of ZAMM under RvM’s direction, of which RvM wrote about one third himself. The name of the reviewer was always mentioned.⁶⁵

With the new start of ZAMM in 1947, the old format of ZAMM was largely continued, including book reviews printed in two columns. In more recent times, book reviews in ZAMM have dramatically decreased – also the interest of publishers.⁶⁶

In this short section, I would like to give a first impression of RvM’s numerous book reviews in ZAMM with some extracts from his reviews. I will do this from a special point of view, namely RvM’s various “roles” as a reviewer according to his versatile interests and knowledge and his position as an applied mathematician between the established subjects like physics, mathematics, engineering, philosophy and their fields of application like education and industry. Several reviews allow a better understanding of RvM’s attitudes in other situations.

Already in [RS-Mises-2020, 20] RvM’s sharp-tongued review of a book by L. Lichtenstein was mentioned and the fact that the latter felt offended by it. When considering the following excerpts one has to assume that they did not earn RvM much sympathy with Georg Hamel, his former boss, and with the upcoming first-rate applied mathematician Alwin Walther (1898–1967) either.

In an otherwise very positive review of the book *Foundational Notions of Mechanics (Grundbegriffe der Mechanik, 1921)* by Hamel, RvM says in the first volume of his journal, at a time when the theory of relativity was still struggling for recognition even among scientists:

“For the wider circle of readers, for whom the book is intended, the assertion that one of the main achievements of Einstein’s theory is the ‘fixing of the unshakable idea of absolute space and absolute time’ can only be confusing. This also applies to what is said in support of this strange sentence.” (ZAMM 1: 224)

In 1929, RvM wrote about Walther’s *Introduction to the Mathematical Treatment of Scientific Problems (Einführung in die mathematische Behandlung naturwissenschaftlicher Fragen)*, among other things:

“In general, the main focus of the author seems to be the desire to appear original. One is tempted to advise German publishers, who often complain about the excessive overproduction of books, not to publish a new introduction to higher mathematics for ten years. We have enough books, some of them excellent, and really fruitful new ideas are not to be expected in this field in the near future.” (ZAMM 9: 253)

About an encyclopedia of mechanics published in Vienna in 1923 by a professor at his former alma mater, the TH, RvM says without mercy:

“After these samples, anyone who already knows the elements of hydromechanics will probably come to the conclusion that the author, instead of writing a textbook, should still go to school himself.” (ZAMM 4: 272)

⁶⁴ Herzberger Papers Jerusalem. RvM’s letter Istanbul, October 9, 1934.

⁶⁵ In the case of several books reviewed in succession by the same reviewer, the name sometimes appeared only under the last book discussed.

⁶⁶ Kind communication by the editor Holm Altenbach, May 4, 2020.

Although RvM was mainly an applied mathematician, as a reviewer he sometimes assumed the role of the pure and rigorous mathematician, probably also in order to mute still existing reservations against applied mathematics. RvM objected to a book on the foundations of probability theory:

“The author probably only knows mathematical set theory from hearsay. He defines probability as the quotient of the powers [Mächtigkeiten] of two sets.” (ZAMM 4: 445)

But RvM also occasionally pointed out the ambivalent position of the applied mathematician vis-à-vis modern mathematics, for instance, when he said the following about the very successful *Introduction to Set Theory (Einleitung in die Mengenlehre 1928)* by Adolf Fraenkel:

“Even if set theory, according to the current state of affairs, must be considered rather distant from applied mathematics, a review of this book seems to me to be very appropriate . . . Incidentally, perhaps the time when questions of set theory can become important for the applications of mathematics is not very far off.” (ZAMM 9: 252)

Elsewhere RvM emphasized the specificity of applied mathematics compared to physics. In the review of a *Handbook of Physics* (Springer 1927/28) he said:

“In a series of final chapters, K. Mader acquaints physicists with numerical and graphical methods that have long been common in technology and certainly deserve to be included in mathematical physics.” (ZAMM 8: 500)

In his 1926 review of an English book on the history of mathematics RvM wrote, probably critical of the conditions in Germany:

“As is the natural view in England, there is no separation between pure and applied mathematics in the presentation.” (ZAMM 6: 335)

Elsewhere RvM dealt with the methodological and historical aspects of applied mathematics. In his review of Julius Bauschinger’s *The Determination of the Orbits of the Celestial Bodies (Die Bahnbestimmung der Himmelskörper, 1928)* RvM wrote:

“Calculating astronomy [rechnende Astronomie] is the ancestor of applied mathematics. . . . If one wants to draw conclusions from the experiences of astronomers for the development of other parts of applied mathematics, one will have to recognize above all that in the long run only the simplest procedures will hold their ground, but that these, in order to become really useful, require a very thorough elaboration through to the smallest details.” (ZAMM 9: 82)

RvM emphasized useful works on little developed areas of applied mathematics when he said in the review of *Ballistics (Ballistik, 1922)* by the Greifswald mathematician Theodor Vahlen:

“It is a great merit to have not only found out the essentials from the almost unexplorable semi-scientific literature in this field, but also to have created a clear classification of material based on new aspects.” (ZAMM 3: 69)

This book review should be remembered when you wonder about RvM’s support for the Nazi Vahlen as his successor in Berlin in 1933 (see below).

RvM also used book reviews to represent his philosophical positions in a German environment largely averse to empirical philosophy. About the fifth edition of the *Popular Science Lectures (Populär-wissenschaftliche Vorlesungen 1923)* by Ernst Mach, who died in 1916, RvM said:

“The scientific literature of Germany and other nations has very few books that can be compared to this popular work of the great physicist and philosopher.” (ZAMM 4: 528/29)

RvM often showed benevolence even towards non-established scientists or academic outsiders. He attested the Berlin school teacher Erich Mosch an unusually high quality of his *Physics Textbook (Lehrbuch der Physik)* published in 1925:

“One finds clear and reasonable formulations everywhere, which are far above what is offered in most university textbooks. I hardly know of any German textbook of mechanics, including the most famous ones, in which something as understandable and intelligible would be said about the law of inertia as here in the second chapter on p. 32.” (ZAMM 6: 82)

This book review must have greatly strengthened Mosch’s authority also in scientific circles and his ability to write his own critical book reviews in ZAMM since the mid 1930s (see Section 2.5).

RvM also tried to meet outsiders of contemporary technology with objectivity. In a thoroughly benevolent but also critical review of the book by the rocket pioneer Hermann Oberth *Paths to Space Travel (Wege zur Raumschiffahrt 1929)*, RvM said:

“The real difficulties of space travel, i.e. the ascent to spaces far from the earth’s surface, lie in the technical and, as far as the ascent of living beings is considered, in the physiological field. . . .

And that is why it is a useful beginning that through books like this one, attention is drawn to the rocket problem, even if this is done here in a way that appeals at least as much to the sensationalist need as to the scientific research urge.” (ZAMM 9: 517)

1.6 | RvM’s mathematics- and mechanics-related policies in ZAMM

In addition to the publication of mathematical and technical articles and reviews of various kinds, RvM has contributed to the discussion of scientific and educational policies, particularly in the “News” and “Letters to the Editor” sections. First of all, the publications in ZAMM concerning GAMM, founded in 1922 with RvM being managing director (Geschäftsführer), should be mentioned. On the one hand, lectures from GAMM meetings (often shortened as abstracts) were published regularly. On the other hand, organizational reports on GAMM meetings appeared, especially for the sub-sections in Göttingen and Berlin. A close relationship between ZAMM and GAMM has been maintained until today. As the title page says: “Edited in cooperation with Gesellschaft für Angewandte Mathematik und Mechanik e. V. (GAMM).” However, from 2002 talks at GAMM meetings appear in the new journal *Proceedings in Applied Mathematics and Mechanics* (PAMM).

Another example of an important scientific and technical discussion made possible by ZAMM is the one on the “introduction of a uniform vector notation,” which was held in the first two volumes of ZAMM in 1921/22. Here, the proposal of the “Committee for Units and Formula Notations” presented (anonymously) by RvM in October 1921 was first discussed by Prandtl in 1922 in the section “Letters to the Editor.” Already at the beginning of the century Prandtl had been significantly involved in the discussion among German engineers, physicists and mathematicians between the so-called physical and mathematical directions in vector analysis. What was new about the ZAMM discussion in 1920/21 was that leading foreigners such as the Dutch mathematician J.A. van Schouten and the Russian professor of engineering J. Spielrein also contributed at length, as there was still no international agreement on designations and theories.

In the “News” section, RvM frequently reported – often anonymously – about scientific events and organizations, appointments, deaths, or he had them reported. Among them were of course reports about his own institute. He let his student Fritz Rehbock report about the study program of the institute (Rehbock 1926). Under the title “Utilization of scientific research for the industry” RvM wrote anonymously in 1932:

“The representatives of applied mathematics and mechanics in Göttingen have founded an organisation called ‘Göttingen office for the mediation of engineering research’ [Göttinger Vermittlungsstelle für ingenieurwissenschaftliche Untersuchungen, Göttingen, Böttingerstraße 8], which is to carry out scientific-technical work on a broad basis in the interest of industry at the request of interested parties and with the involvement of several research institutions. On this occasion, it should be pointed out that the Institute for

Applied Mathematics at the University of Berlin, which is headed by Prof. v. Mises, also carries out work of a mathematical nature for the purposes of industry or other public and private enterprises at their request.” (ZAMM 12: 191/92)

As late as June 1933, when the end of his association with ZAMM was foreseeable, RvM drew attention in two anonymous reports to the construction of a new, enlarged wind tunnel in Göttingen, which had been secured under the new political conditions, and he spoke of the “prospect of further success in the interest of science and German aviation” (ZAMM 13: 250).

Two examples shall illustrate in the following that RvM clearly expressed his science policy positions in ZAMM and did not shy away from certain unauthorized actions which, at least to us today, could appear to be a violation of his competences as editor.

In 1924 and 1925 there were discussions on ministerial proposals to reduce the teaching of mathematics from 4 to 3 hours a week at some types of higher secondary schools (grammar schools etc.).⁶⁷ The “Reich Mathematical Associations” (“Reichsverband deutscher mathematischer Gesellschaften und Vereine”), led by RvM’s former head in Brünn (Brno), Georg Hamel, was the main protest against this. RvM found these protests too agitated and exaggerated. Being anyway critical of in his opinion too abstract mathematical teaching at schools RvM doubted above all the claim that by reducing the teaching of mathematics the understanding of the pupils for technology would necessarily suffer. RvM summarized his views in the second of two notes in ZAMM:

“The relationship between the purely mathematical school subject matter and technology is sparse and remains on the surface anyway. Anyone who sincerely wishes that a certain understanding of the meaning and cultural significance of modern technology be conveyed to pupils at school must make every effort to ensure that this circle of thoughts and ideas gradually penetrates the cultural studies subjects,⁶⁸ which will always have the strongest and most penetrating effect on the growing youth.” (Mises 1925b, 181)

Perhaps RvM himself realized that he had gone one step too far with his individualism in this discussion. When Erich Trefftz in Dresden, who was later to become his successor as editor of ZAMM, told him about his dissenting opinion, RvM asked him to publish it in ZAMM:

“In any case, it is very important to me not to give the impression that in the journal no one can express a different opinion than mine.”⁶⁹

A second example for RvM’s individualism are various, mostly anonymous statements by RvM in the matter of the International Congress of Mathematicians planned for 1928 in Bologna (ZAMM 8: 159, 248, 340). Together with Bieberbach and Erhard Schmidt from Berlin, and the prominent Dutch mathematician L.E.J. Brouwer, and in contrast to the majority of German mathematicians under the leadership of David Hilbert in Göttingen, RvM opposed the participation of German mathematicians in Bologna. He was not convinced that the congress, which was mainly devoted to pure mathematics, would be independent of the International Mathematical Union (IMU) which had coordinated the boycott of Germany and Austria after the Great War (1914–1918). In his opinion he found some support from Prandtl, but none from von Kármán who attended Bologna.⁷⁰ When, after the congress had been held, four applied mathematicians and members of GAMM led by Otto Blumenthal in Aachen (Hilbert’s longtime confidant) submitted a “short note on the course of the congress”⁷¹ for publication in ZAMM, RvM, in a four-page letter to Blumenthal dated October 23, 1928, rather brusquely refused to publish it:

“In any case, you will understand that I cannot publish in my journal a communication that completely evades the essential question [‘Relationship of the Congress to the Union’] and instead uses textbook phrases like

⁶⁷ More details on this discussion in (Siegmond-Schultze forthcoming).

⁶⁸ By these were meant German, history, geography, and philosophy.

⁶⁹ “Jedenfalls liegt mir sehr viel daran, nicht den Eindruck zu erwecken, als ob in der Zeitschrift keine von der meinen abweichende Auffassung zu Worte kommen könnte.” Trefftz Papers, RvM to Trefftz, November 20, 1924. University Archives Dresden.

⁷⁰ Kármán Papers 20.36, v. Kármán to RvM, July 9, 1928.

⁷¹ The wording of the “short note,” which came with an accompanying letter signed by T. Pöschl (Karlsruhe), G. Doetsch and F. Pfeiffer (both Stuttgart) in addition to Blumenthal between 13 and 18 October, does not emerge directly from RvM’s correspondence.

‘landmark in history’, ‘memorable reception’, etc. It would also be highly inappropriate to assure our readers that a new era of international relations has now dawned. For, as you know, two international mechanics congresses have already taken place with the active participation of the journal and its editor (cf. e.g. *manifestation* vol. 4, p. 85)⁷² which were completely free of ‘misunderstandings’ ... at which the cooperation of Germans, French, Englishmen, etc. was so peaceful that it occurs to no one to speak of it or even to praise it in opening speeches or later reports. It is only necessary to clearly and unambiguously exclude from the outset the participation of that questionable organization, which was created for the sole purpose of preventing the international cooperation which we have been cultivating with constant success for a long time.”⁷³

It is not surprising that the short note from Blumenthal and colleagues was not printed in ZAMM. Instead, RvM published there anonymously a note on the German contributions to the applied sections in Bologna. The following remark in it was probably intended to underline the fruitlessness of the congress at least for international cooperation in the field of applied mathematics:

“In the opening session of the IV Section, Mr. Gini-Padua presented for discussion the plan for the establishment of an International Institute for Applied Mathematics, suggested by Mr. B. Lagunoff - Kieff. The Assembly voted against the plan.” (ZAMM 8: 504)

There is no doubt that in the discussion with Blumenthal and colleagues, RvM on the one hand glossed over the political situation around the international mechanics congresses [RS-Mises-2020, 18], and on the other hand underestimated the attempts at relaxation among the pure mathematicians represented by David Hilbert in Göttingen.⁷⁴ The subliminal institutional conflict between Berlin and Göttingen played into this. RvM’s positioning against Bologna was surprising for people like the Göttingen physicist Max Born, who wrote to his friend Einstein on November 20, 1928:

“I can understand this in Erhard Schmidt’s case, for he always did lean to the right in politics, as a result of his basic emotions. For Mises and Bieberbach, however, it is a rather deplorable symptom.” (Born 1971, 98)

Indeed, von Mises who got along well with the convinced Republican Gumbel, was a follower of Ernst Mach and an admirer of Karl Kraus in Vienna cannot be put into the same camp as the many nationalistic and anti-republican Professors of the Republic of Weimar, where liberals such as Born and Einstein were clear political outsiders. RvM was also a bridge builder between mathematicians and engineers and as such no one-sided individualist, as the first part of this article has shown. But as in the case with his dissent with the Reichsverband in the school hour discussion of 1924 (above) he quite often disagreed with the mainstream when he felt that the interests of his field applied mathematics were at stake. He was occasionally prone to emotional outbursts as well. In any case, with his opposition to the Bologna congress and also with the tone of his letter to Blumenthal, RvM probably underlined his role as a sometimes arrogant individualist at least within the German mathematical community.

2 | RvM’s EMIGRATION 1933 AND ASPECTS OF ZAMM UNDER THE NS

2.1 | RvM’s last year in Berlin

Hitler was appointed Reich Chancellor on January 30, 1933. The terrorist rule of the Nazis and their backers was established step by step, through Reichstag fire and the Enabling Act (Ermächtigungsgesetz). The first major state-organized pogrom

⁷² This is a reference to RvM’s editorial of April 1924, which was mentioned in [RS-Mises-2020, 17].

⁷³ “Jedenfalls werden Sie verstehen, dass ich in meiner Zeitschrift nicht eine Mitteilung veröffentlichen kann, die der wesentlichen Frage [‘Verhältnis des Kongresses zur Union’] vollkommen ausweicht und sich dafür in schulbuchmäßigen Phrasen wie ‘Markstein in der Geschichte’, ‘denkwürdiger Empfang’ usw. ergeht. Auch wäre es in höchstem Maße deplaciert, gerade unseren Lesern die Versicherung vorzusetzen, dass jetzt eine neue Ära der internationalen Beziehungen angebrochen sei. Denn, wie Sie wissen, haben bereits zwei internationale Mechanik-Kongresse unter tätiger Mitwirkung der Zeitschrift und ihres Herausgebers (vgl. z.B. die Kundgebung Bd.4, S.85) stattgefunden, die völlig frei von ‘Missverständnissen’ waren ... auf denen die Zusammenarbeit von Deutschen, Franzosen, Engländern usf. eine derart friedliche war, dass es niemandem einfällt, davon zu sprechen oder gar sie in Eröffnungsreden oder späteren Berichten zu rühmen. Es ist nur erforderlich, von vornherein klar und unzweideutig die Mitwirkung jener fragwürdigen Organisation auszuschalten, die ausschließlich zu dem Zweck geschaffen worden ist, die internationale Zusammenarbeit zu verhindern, die wir seit langer Zeit mit ständigem Erfolg pflegen..” Mises Papers, HUG 4574.5, box 2, f. 1928.

⁷⁴ More about Hilbert’s efforts for Bologna in (Siegmond-Schultze 2016).

was the so-called “Judenboykott” (“Boycott of the Jews”) of April 1, 1933; on April 7, the infamous “Law for the Restoration of the Professional Civil Service” (“Berufsbeamtengesetz”) was passed, which, with a few exceptions, expelled all state employees who had at least one grandparent who belonged to the Jewish religion. Although RvM was covered by the exceptions as a World War I participant and pre-war civil servant, he saw the signs of the times and sought employment abroad, eventually finding it in Istanbul. RvM’s pupil Lothar Collatz, to whom he gave advice for his future scientific work the day before his departure, correctly described more than half a century later the impact of Nazi rule on German applied mathematics:

“The journal ‘Deutsche Mathematik’ was published and authors were advised not to quote Jewish mathematicians whenever possible. Many important scientists, especially mathematicians close to numerics, and also many representatives of mechanics and physics left Germany. Richard von Mises left Berlin in November 1933 for Istanbul and later for the USA, together with Hilda Pollaczek-Geiringer.” (Collatz 1990, 286)

With regard to the effects of the Nazi regime on German technology, it is probably also necessary to consider the emigration after 1945, as an indirect consequence, which included rocket engineer Wernher von Braun and – from ZAMM’s surroundings – Karl Pohlhausen.

The dismissals by the Nazis had to be reflected in various ways on the pages of ZAMM, which continued to be published by RvM until the end of 1933. A moving document in ZAMM is the obituary of the engineer Franz Eisner (1895–1933), who was a part-time lecturer at the TH (Technische Hochschule) Charlottenburg and is mentioned several times in the correspondence between RvM and von Kármán as a promising young mechanist. The obituary by Georg Weinblum, who also mentions Eisner’s precarious health, leaves no doubt that Eisner’s suicide in June 1933 was a direct consequence of his dismissal from the TH:⁷⁵

“Eisner was a born teacher and as such had great success in his university activities, which gave him much joy; the resonance of his audience was almost a condition of life for him. . . . When strong emotional upheavals – there were no reasons for material concern – approached him, he no longer felt up to them and, after previous heavy battles, voluntarily left life without bitterness.” (ZAMM 13: 330)

RvM had his 50th birthday on April 19, 1933, and for this occasion his colleagues prepared a special issue of the journal (ZAMM 13: 65–170). In the first part of this article, I have already referred to the greeting address in the special issue, which emphasized the unchanged importance of the more classical fields of mechanics promoted by ZAMM [RS-Mises-2020, 20]. The special issue contained 24 contributions from 25 colleagues, with the high number of 12 foreigners being conspicuous,⁷⁶ although according to the ZAMM tradition German was used as language with two exceptions (Hadamard/Fréchet and Taylor). Compared to ZAMM, the topics in this issue were shifted somewhat more towards mathematics, which corresponds to the breadth of RvM’s interests. Bieberbach, who soon defected to the Nazis, opened the birthday issue with a short article on nomography (ZAMM 13: 66). In two entries in his diary, RvM expressed surprise about the project and joy about the quality of the work when he heard about the preparations in March 1933:

“7. [III.33]

I learn through Reissner from a planned birthday issue of Zamm [sic]. Get more detailed explanations from Hilda. All in all quite pleasing.

8. [III.33]

In the morning Reissner and Hellmich are with me, bringing me the proofs of the birthday issue, which contains surprisingly great contributions. I am quite pleased about that. Especially Hilda’s contribution rather pleasing.”⁷⁷

⁷⁵ Eisner’s dismissal and an unsuccessful petition by students in his favor are documented in (Baganz 2013, 95f.).

⁷⁶ J.M. Burgers, Harald Cramér, Leopold Fejér, Jacques Hadamard and Maurice Fréchet, A. Khintchine, K. Körner, T. Levi-Civita, G. Pólya, A. Stodola, G. I. Taylor, W. Wirtinger.

⁷⁷ “7. [III.33] Erfahre durch Reissner von einem geplanten Geburtstagsheft der Zamm. Nähere Erklärungen von Hilda dazu erhalten. Im ganzen doch recht erfreulich. 8. [III.33] Vormittags Reissner und Hellmich bei mir, überbringen mir die Fahne des Geburtstagsheftes, das überraschend großartige

On his birthday in the spring of 1933, RvM may still have had hopes of being able to keep his job in Berlin, and he was more concerned about his collaborators, including authors in ZAMM.

One of them was the 33-year-old Walter Tollmien (1900–1968), a student of Prandtl's, who at the time was working at von Kármán's Caltech in California without a permanent position or long-term perspective. In 1926 Tollmien had made a major contribution to the mathematical foundation of Prandtl's turbulence theory with a paper in ZAMM.⁷⁸ The "Tollmien-Schlichting waves" are also named after him. In 1933 RvM felt that Tollmien, presumably being an "Aryan", had good chances of obtaining a position in Germany. On June 10, 1933, RvM wrote to von Kármán:

"I'd like to return to the matter of Dr. Tollmien. I do not know if he still desires to come to Germany under the present circumstances. In any case, I have to tell you [Dir] that the irrevocable prerequisite for any kind of employment or scholarship or suchlike is to make a statement on his honor [ehrenwörtliche Erklärung] that his four grandparents are of 'Aryan, in particular non-Jewish descent.' As long as I do not know whether Mr. Tollmien can or will make such a statement, it is impossible for me to do anything. Besides I believe that in the positive case the prospects are not bad as indeed a large part of all the previous candidates has to be disregarded now. I ask you to give me the relevant information as soon as possible."

Von Kármán wrote on the reverse side of this letter:

"Dear Mr. Tollmien,
enclosed a letter from H. v. Mises. Indeed a 'document of our time.' Please let me know if I should transmit the written evidence of your racial purity to Berlin or whether you want to write to Mises yourself. Please return the letter after having enjoyed it."⁷⁹

Tollmien did return and stayed in Germany; 20 years later he contributed to the birthday issue of ZAMM for RvM (ZAMM 33: 151–155).

In a letter dated August 18, 1933, which Hilda Geiringer, who had already been dismissed, wrote to RvM's mother Adele von Mises in Vienna, it is indicated that in RvM the hope for a future in Germany had largely disappeared. However, Geiringer and RvM feared less for the continued existence of ZAMM:

"The journal has not perished at all. He [RvM] once had a conversation with Matschoß and Hellmich [from the VDI, RS], where he asked them if they didn't want a change. At first they didn't understand what he wanted, but after he had made it clear to them, they said that this wasn't an official matter and didn't concern anybody. In most similar cases the previous managers and employees had been thrown out by the fact that some 'immaculate' person who wanted the job in question had intrigued against them and declared them 'unacceptable'. Since, however, obviously nobody wanted to edit the ZAMM, and therefore nobody there was stirring up trouble, they would be more than satisfied if everything remained as it was. By the way, it is a big question whether Matschoß will stay, because although perfectly Aryan, he is not close enough to the Party. ... If ZAMM perishes or is taken over by someone else, your son intends to found an international journal for applied mathematics or the like, or especially for statistics, as soon as he is outside and can act. I can only say that he takes all this absolutely calmly and without emotional moments. Incidentally, as you will know better than I do, the Herr Professor is such that most things make him especially happy at the beginning, when you are setting them up, when you have to deal with difficulties."⁸⁰

Beiträge enthält. Darüber doch sehr erfreut. Namentlich die Leistung von Hilda dabei recht erfreulich." Mises Papers, HUG 4574.2 Diaries 1903–1952. Transcribed from Gabelsberger shorthand.

⁷⁸ (Eckert, 2017, 171/172) on Tollmien's work in (ZAMM 6: 468–478).

⁷⁹ A facsimile of this remark by Kármán is printed in (Siegmond-Schultze 2019, 174). The text of RvM's letter on ZAMM's header is reproduced as a facsimile in (Brüning et al. 1998, 15). The source is the Kármán Papers, 20.37.

⁸⁰ "Die Zeitschrift ist keineswegs eingegangen. Er [RvM] hatte einmal eine Unterredung mit Matschoß und Hellmich, wo er sie fragte, ob sie nicht eine Änderung wünschten, diese kapierten erst nicht was er wolle, aber nachdem er es ihnen klar gemacht hatte, meinten sie, das sei doch keine offizielle Sache und gehe niemanden was an, in den meisten ähnlichen Fällen seien die bisherigen Leiter und Angestellten dadurch hinausgeworfen worden, daß irgendein 'Einwandfreier', der die betreffende Stelle wollte, gegen sie gestänkert und sie als 'untragbar' erklärt hätte. Da aber offenbar niemand die 'ZAMM' herausgeben wolle, und also niemand da stänkere, seien sie nur sehr zufrieden, wenn alles so bleibe. Im übrigen ist es eine große Frage,

Persönliches.

Prof. Dr. Richard v. Mises, bisher Direktor des Instituts für angewandte Mathematik an der Universität Berlin, hat eine Berufung als ordentlicher Professor der reinen und angewandten Mathematik und Direktor des zu begründenden mathematischen Instituts an die Universität Istanbul angenommen.

Frau Priv.-Dozent Dr. Hilda Pollaczek-Geiringer, bisher Oberassistentin am Institut für angewandte Mathematik der Universität Berlin ist zu wissenschaftlichen Forschungsarbeiten an die Université libre in Brüssel berufen worden.

Prof. Dr. W. Prager, früher in Göttingen, hat einen Ruf als ordentlicher Professor der Mechanik an die Universität Istanbul angenommen.

FIGURE 6 Announcement in ZAMM 13 (December 1933, 456) of imminent emigration to Turkey by Richard von Mises and Wilhelm Prager (Göttingen), and of (temporary) move to Brussels by Hilda Geiringer

2.2 | Care by RvM for his successors at the institute and at ZAMM

Erich Trefftz (1888–1937) was RvM’s doctoral student at Strasbourg in 1913 and had been on “Du” with his former supervisor since the mid 1920s. RvM considered him the first candidate to succeed him at the Berlin Institute. However, he did not consider Trefftz’ appointment realistic under the political conditions of the time.



FIGURE 7 Erich Trefftz (1888-1937) – Courtesy Kustodie Technische Universität Dresden (Kind mediation by Klaus Mauersberger)

In a letter to his colleague in the faculty in Berlin Erhard Schmidt on October 21, 1933, RvM even recommended the 64-year-old Nazi mathematician Theodor Vahlen as his successor, because he obviously hoped this move would provide political stability for his former institute:

“As far as the final arrangement is concerned, the only successor who can be taken into consideration is Prof. Erich Trefftz in Dresden. . . . However it appears possible and beneficial to find an interim solution for the coming years, i.e., to find someone who would be capable of safeguarding the existence of the Institute

ob Matschoß bleibt, denn obgleich einwandfrei arisch, steht er doch der Partei nicht nahe genug. . . . Wenn die ZAMM eingeht oder von wem anderen übernommen wird, so meint Ihr Sohn ev. eine internationale Zeitschrift sei es für Angewandte Mathematik o.dgl., sei es insbesondere für Statistik zu gründen, sowie er draußen ist und sich rühren kann. Ich kann nur sagen, daß er all das absolut ruhig und ohne Gefühlsmomente auffaßt. Herr Professor ist übrigens, wie Sie ja besser wissen werden als ich, so, daß ihn die meisten Dinge besonders am Anfang freun, wenn man sie einrichten, sich mit Schwierigkeiten auseinandersetzen muß.” Mises Papers, HUG 4574.5.2, box 5, Letters and postcards to his mother (1929–1935).

and this even in a direction which conforms with the prevailing trends [heutige Zeitströmung]. I suggest that Prof. Th. Vahlen, who is active for the time being in the ministry for education, but who is evidently not happy there, should take over the chair and the Institute for Applied Mathematics.” (Siegmond-Schultze 2009, 171)

RvM, who – as late as October 30, 1933 – took part in the faculty meeting concerning his successor, found that Vahlen’s work in ballistics was – in addition to his political stance – in tune with the “prevailing trends.” Since RvM himself had given Vahlen’s ballistic work a positive evaluation in ZAMM (see above), he was able to reconcile this proposal with his mathematical conscience.

Two years later, however, when it came to Vahlen’s succession at the Berlin Institute for Applied Mathematics, it became clear that the political situation had by no means calmed down. Even in 1935, Trefftz had no chance to take over the institute. The leader of the NS-loyal lecturers of Berlin University (NS-Dozentenschaftsführer) von Gleispach declared on February 22 in an internal political review:

“Prof. Trefftz is politically opposed to National Socialism and belongs to the type of intellectuals whose caustic mind disparagingly criticizes everything that has its origin and carrier in something other than the purely spiritual. He gave Jewish students special treatment not only in class, but also after they left the university.” (Siegmond-Schultze 1984, 55)

Regarding ZAMM, on October 17, 1933, 2 weeks before the faculty meeting mentioned above, RvM wrote a letter to his former doctoral student – still with the ZAMM header – asking him to take over the editing of the journal (see Appendix for the full text).

PROFESSOR DR. v. MISES
 SCHRIFTFLEITUNG DER ZEITSCHRIFT FÜR ANGEWANDTE
 MATHEMATIK UND MECHANIK
 BERLIN NW 87, SIEGMUNDSHOF 9
 FERNRUUF: C-9 TIERGARTEN 6692
 VDI-VERLAG G·M·B·H

Z 248/33

Herrn
 Prof. Dr. E. Trefftz
Dresden-A.
 Kulmstr. 1.

BERLIN NW 87, DEN 17. Oktober 1933

Lieber Trefftz!

Ich habe gestern mit Prof. Matschoss über die Zukunft der Zamm gesprochen. Der VDI und der VDI-Verlag sind entschlossen, die Zeitschrift jetzt nicht éingehen zu lassen. Da es jedoch nicht möglich ist, sowohl aus praktischen wie aus gesetzlichen Gründen (der Herausgeber muss seinen Wohnsitz im Inland haben), dass ich die Zeitschrift weiterführe, muss ein neuer Herausgeber gesucht werden. Wir könnten keinen Geeigneteren finden als Dich, und ich möchte jetzt an Dich die dringende Bitte richten, diese Aufgabe auch zu übernehmen. Ich glaube, dass die Arbeit, die Du

FIGURE 8a Top of von Mises’ 2 page letter to Trefftz October 1933 (see full text in Appendix) (Source: University Archives TU Dresden)

Auf jeden Fall wäre es sehr erwünscht, ja eigentlich notwendig, dass Du noch vor meiner Abreise hierher kommst, damit wir einerseits die Angelegenheiten besprechen und andererseits die Vereinbarung zwischen Dir und dem VDI-Verlag geschieht. Ich freue mich besonders, dass ich auf diese Weise noch Gelegenheit haben werde, Dich vor meiner Uebersiedlung zu sehen. Sei so gut und antworte mir möglichst bald im zustimmenden Sinne.

Mit den besten Grüßen

Dein

Mises

FIGURE 8b Bottom of von Mises' 2 page letter to Trefftz, October 1933 (see full text in Appendix)

Apparently Trefftz agreed and the meeting in Berlin proposed by RvM took place. Trefftz's papers in the university archives of the Technical University (TU) Dresden contain a one-page handwritten note in pencil by Trefftz:

Mises würde die Zeitschrift erliegen lassen.
 Reduzierter Umfang ^{macht} keine sachgemäße Auswahl
 unmöglich. —
 Umfang jetzt 70% des Maximalumfangs
 zunächst kein Aryanparagraf —
 (der Produktion)
 Abnahme durch Judenabwanderung nicht zu erwarten
 Juden publizieren bei uns wenig. —
 V.D.I. zahlt für ~~ein~~ eine Sekretärin M. 100.—
 Postmaterial in natura —
 Honorar M. 720.— im Jahre.

FIGURE 9 Excerpt from Trefftz's note about his last meeting with RvM in Berlin 1933 (Source: University Archives TU Dresden)

The excerpts mean in English translation:

“Mises would let the journal perish. Reduced volume makes a proper selection impossible. ... For the time being no Aryan paragraph. Decline in production due to emigration of Jews not to be expected. Jews publish little with us [in our journal] V.D.I. pays 100.- Marks [apparently monthly, RS] for a secretary.

Stamps and materials provided extra, honorarium M. 720.- per year.”

At the end of the note it says: “Competing enterprise by von Mises not planned.”⁸¹

Mit dem vorliegenden Heft legt Professor Dr. v. Mises, der die Zeitschrift begründet und dreizehn Jahre hindurch geleitet hat, mit Rücksicht auf seine Übersiedlung nach Istanbul, die Schriftleitung nieder und scheidet als Herausgeber aus. An seine Stelle tritt Professor Dr. Erich Trefftz, Dresden.

Für die Schriftleitung verantwortlich: Professor Dr. von Mises, Berlin NW 87, Siegmundshof 9;
für den Anzeigenteil: Peter Valerius, Berlin NW 21. — Copyright 1933 by VDI-Verlag G.m.b.H., Berlin NW 7.
Druck von A. W. Zickfeldt, Osterwieck am Harz.

FIGURE 10 Bottom of the last page (458) of ZAMM for 1933, announcing RvM’s departure from ZAMM and Trefftz taking over as editor

After taking over the editorial office, Trefftz wrote to Prandtl on December 1, 1933:

“Regarding the Z.A.M.M., I count on your approval of the following measure, which I have taken after consultation with Matschoss and Nägel. In the future, the title page will read: edited by E. Trefftz, Dresden, with the collaboration of renowned colleagues. Therefore, the names of the co-editors will no longer be explicitly mentioned on the title page. You can guess why. I wanted to avoid being forced to delete the non-Aryan names.” (Gericke 1972, 13)

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UNTER MITWIRKUNG NAMHAFTER FACHGENOSSEN
HERAUSGEGEBEN VON PROFESSOR DR. E. TREFFTZ, DRESDEN**

FIGURE 11 New Title Page ZAMM 1934 (top)

2.3 | Care by RvM for his students, co-workers, and authors after 1933⁸²

Still in his last days in Berlin and later in Turkey, RvM also tried to help the “non-Aryans” among his former authors and collaborators, including Geiringer. The latter did not fall under any exemption of the NS-law and was immediately dismissed.

On October 28, 1933, RvM sent a report for Stefan Bergmann to his British colleague and applied mathematician Richard V. Southwell, who forwarded it to the Academic Assistance Council (later Society for the Protection of Science and Learning, SPSL):

“One owes to him a beautiful method for the numerical treatment of elastic problems (by means of developments according to special orthogonal functions).”⁸³

This judgment is based on Bergmann’s 1921 PhD thesis and its later application in an article in ZAMM (Bergmann 1931).

⁸¹ “Konkurrenzunternehmen von Mises nicht beabsichtigt.”

⁸² Support from RvM for former co-workers at ZAMM is revealed in the archives of the Society for the Protection of Science and Learning (SPSL) in the Bodleian Library in Oxford, above all in the files J. Ratzersdorfer (245/6), S. Bergmann (277/5), H. Pollaczek-Geiringer (279/3), M. Herzberger (280/3). I cannot investigate this in detail here.

⁸³ “Man verdankt ihm ein schönes Verfahren zur numerischen Behandlung elastischer Probleme (mittels Entwicklungen nach besonderen orthogonalen Funktionen).” SPSL, file 277/5 (Bergmann, S.), fol. 322.

RvM wrote to Herzberger from Istanbul on October 9, 1934, after he had heard of his dismissal by the Zeiss company in Jena:

“I am firmly convinced that you will find something suitable and something good, since the rest of the world is certainly not so unreasonable to dispense with services that are in many ways as useful as yours..”⁸⁴

RvM then recommended Herzberger to contact various refugee organizations, provided him with addresses, and wrote further:

“I am in the process of recommending to the Zurich Notgemeinschaft⁸⁵ some scientists for lectureships, partly in South Africa, partly in Ecuador, and I would like to take this opportunity to name you as well. However, it is my opinion that the right place for you would be in the western countries of Europe or in North America, at least in a country where there is already an advanced optical industry. ... You will be interested to know that from this semester onwards Prof. Geiringer is here, who sends warm greetings. Best regards from me, too. Yours Mises.”⁸⁶

RvM enclosed an expert opinion for Herzberger’s use, from which was quoted above in Section 1.4.

2.4 | The Trefftz Memorial-Issue 1938

On October 28, 1936 RvM wrote to Trefftz in Dresden, not using the intimate “Du”, probably in order to protect Trefftz against political screening of his correspondence from abroad.⁸⁷ His hopes for Trefftz’ soon recovery from a “severe and long illness” (schwere und langwierige Erkrankung) were not fulfilled and Trefftz died 3 months later on January 21, 1937 at age 49.

RvM contributed to a memorial issue of ZAMM for Trefftz, which appeared in February 1938 as the first issue that year. RvM’s contribution begins with the following words:

“I do not want to evade the participation in the honoring of the memory of my longtime friend, former student and later successor Erich Trefftz. It is now almost exactly 27 years since an advanced student first took the floor in the Strasbourg mathematics seminar, which was headed by Heinrich Weber, and immediately attracted the attention of all the lecturers. Shortly afterwards, Trefftz began his doctoral thesis, which later became very famous, and which he quickly completed. Since those days we have never been out of contact, and I have found in him, who in 1921 became my successor in the Dresden chair and in 1933, at my request, took over the management of this journal, a faithful and sincere⁸⁸ friend. ... I will add just two words here: ‘He was a clear head and a reliable man.’” (Mises 1938, 74)

Four months after appearance of the Trefftz-memorial-issue, in a letter to Prandtl dated June 9, 1938, Dr. Dames from the Nazi Education Ministry complained that among the contributors had been several “non-Aryans,” and he asked whether Prandtl had been informed before about this fact. Prandtl replied on June 15, 1938 in a three-page letter in which he insisted that foreign scientists had no understanding of the exclusion of Jews in Germany. In particular, he wrote:

⁸⁴ “Ich bin fest davon überzeugt, dass Sie etwas Geeignetes und etwas Gutes finden werden, da die übrige Welt gewiss nicht so unvernünftig ist, auf Dienste zu verzichten, die in verschiedener Hinsicht so nützlich sind wie die Ihren.” Herzberger Papers, Jerusalem.

⁸⁵ Emergency Committee in Aid of Displaced Foreign Scholars (1933–1945).

⁸⁶ “Ich bin eben dabei, an die Züricher Notgemeinschaft einige Naturwissenschaftler für Lehrstellen, teils in Südafrika, teils in Ecuador zu empfehlen und will Sie bei dieser Gelegenheit auch nennen. Allerdings ist es meine Ansicht, dass für Sie in den westlichen Ländern Europas oder in Nord-Amerika der richtige Platz wäre, jedenfalls in einem Lande, in dem es bereits eine fortgeschrittene optische Industrie gibt. ... Es wird Sie interessieren zu hören, dass von diesem Semester an Frau Prof. Geiringer hier ist, die Sie herzlich grüssen lässt. Auch von mir die besten Grüsse. Ihr Mises.” Herzberger Papers Jerusalem..

⁸⁷ Trefftz Papers, TU Dresden, University Archives.

⁸⁸ When talking about “sincere” (aufrichtig), RvM probably also thought of occasional criticism from Trefftz as in the matter of the 1924 school reform (see above).

“As to the non-Aryans mentioned by you, von Mises was Trefftz’s doctoral advisor and, in addition, predecessor in his [Dresden] chair and could hardly be excluded on such an occasion. . . . Von Kármán, however, is due to his absolutely fundamental achievements so much above any critique, that his exclusion could not come to the mind of anybody who knows the facts.” (Siegmond-Schultze 2018, 516/17)

Prandtl ended the letter to Dames with an argument that referred to economic aspects (need for foreign currency) and was typical of the often tactical and indirect defense of scientific communication in the Third Reich:

“I would also like to add that the Zeitschrift für Angewandte Mathematik und Mechanik (ZAMM) is an internationally read journal. As far as I hear, 70% of the circulation goes abroad. This is another reason why a journal serving international cooperation in this way cannot be judged according to the principles that would apply to purely German journals.”⁸⁹

Apparently, in order not to provoke the Nazi functionary further, Prandtl refrained from mentioning in his letter RvM’s other merits, such as the founding of the very journal ZAMM in 1921 in which this special issue was published. In Prandtl’s own contribution in the Trefftz issue (ZAMM 18: 77–82, 79) one finds some late admission of Prandtl’s with respect to the merits of the “von Mises transformation” in boundary layer theory [RS-Mises-2020, 19]. He acknowledged RvM’s “priority (Priorität)”, in publishing it, which appears as an honorable gesture in the given political situation.

It also seems remarkable that the former student of RvM, Fritz Rehbock (1896–1989), published an obituary of Trefftz even in the mathematical journal with racist overtones “Deutsche Mathematik” edited by Ludwig Bieberbach. Rehbock, who had not been a student of Trefftz, had never worked in Dresden and had just joined the Nazi party NSDAP in 1937 (Tobies 2006, 268/69) did not include any racist or otherwise nationalistic feelings in his obituary of Trefftz. The editor Bieberbach may have been reminiscent of his friendship with RvM in the 1920s, when he accepted passages as the following in Rehbock’s obituary:

“His love of the practical methods of mathematics he owed to his teacher and uncle Carl Runge, . . . his love of mechanics and its neighboring fields to his teacher Richard von Mises with whom he obtained his doctorate in Strasbourg in 1913.” (Rehbock 1937, 582)

In 1954, Rehbock wrote a very devoted and emotional obituary of Richard von Mises (Rehbock 1954).

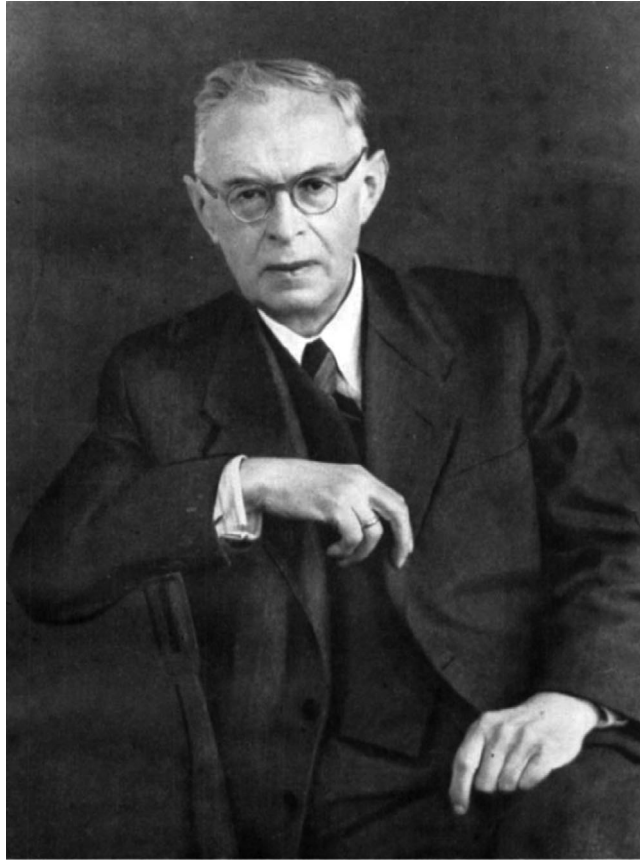
2.5 | Glimpses of ZAMM under the NS-regime after Willers took over, and a voice of reason (Erich Mosch’s book reviews)

Friedrich Adolf Willers (1883–1959), who was the same age as RvM but was “racially acceptable”⁹⁰ to the Nazis, had made a name for himself through work in numerics, in particular through his internationally acclaimed German textbook *Methoden der Praktischen Analysis* (Methods of Practical Analysis) of 1928. From 1928 he was full professor at the Bergakademie Freiberg near Dresden, where Alexander von Humboldt had once studied in 1791/92. His “retirement” with a political background at the age of only 51 years is described in an obituary in ZAMM of 1960, co-authored by his successor as editor since 1959, Helmut Heinrich:

“Unfortunately, Willers’ activity in Freiberg came to an untimely and unpleasant end in 1934. (He) saw himself forced to work energetically on an increase of the strongly decreased level of performance of the students. This led to a sharp contrast between him and the student body, which was exploited by the then ruling NSDAP. Due to the Party’s influence Willers had to apply for his retirement against the will of the professorial collegiate. In this extremely difficult and delicate situation for him, he found a reliable and helpful friend in Trefftz in

⁸⁹ “Ich möchte auch noch hinzufügen, dass die Zeitschrift für Angewandte Mathematik und Mechanik (ZAMM) eine international gelesene Zeitschrift ist. Soviel ich höre, geht 70vH der Auflage ins Ausland. Auch das ist ein Grund, dass eine in dieser Weise der internationalen Zusammenarbeit dienende Zeitschrift nicht nach den Grundsätzen beurteilt werden kann, die für rein deutsche Zeitschriftenunternehmen gelten würden.” Prandtl Papers Berlin, folder GAMM.

⁹⁰ “Rassisch unbedenklich” as the contemporary slang went.



Prof. Dr. phil. Dr. rer.-nat. h. c. Friedrich Adolf Willers
29. 1. 1883—5. 1. 1959

FIGURE 12 Picture of Friedrich Adolf Willers (1883–1959), the new editor from 1937, reproduced from the obituary in ZAMM (Sauer/Heinrich 1960)

Dresden. With him, beyond human relations, a lively scientific exchange of ideas took place, which led to a whole series of remarkable works in the field of elasticity theory.” (Sauer/Heinrich 1960, 3)

After Trefftz’s early death in 1937, Willers was the natural successor as editor of ZAMM. However, he was not allowed to give lectures again until 1939, and was reinstated as a professor at the Technical University (Technische Hochschule) Dresden as late as in the penultimate year of the war, 1944. His personal situation as a mathematician who was little appreciated by the Nazis must have prompted Willers to be politically cautious. The new title page of ZAMM could now again name the staff members, because the Jewish ones among them (Th. von Kármán, H. Reissner, R. Rüdénberg) had emigrated in the meantime.

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UNTER MITWIRKUNG VON K. BEYER VDI, G. HAMEL VDI, L. PRANDTL VDI
UND C. WEBER. · HERAUSGEGEBEN VON FR. A. WILLERS, DRESDEN**

FIGURE 13 New Title Page ZAMM 1937 (top)

Willers' anxiety to quote Jewish authors becomes grotesquely clear in a review he published in ZAMM in 1939. It was about an "unaltered reprint" of the third edition (1882) of Bernhard Riemann's *Partielle Differentialgleichungen und ihre Anwendungen auf physikalische Fragen*, which had just appeared in Braunschweig in 1938. After pointing out the multiple editions of Riemann's work by Karl Hattendorff and then by Heinrich Weber, RvM's boss in Strasbourg who died in 1916, Willers said in his short review:

"After his [Weber's] death, an unaltered print of the Riemann-Weber was published, and about ten years ago the work was completely redesigned with the help of a large number of authors. This, however, completely changed the character of the book, turning it from a textbook into a Handbook [Nachschlagewerk]." (ZAMM 19: 60)

Willers omitted to mention that this "complete redesign" had been coordinated by RvM and his friend Philipp Frank in 1925 and 1930 with their very influential two volume handbook *Die Differential- und Integralgleichungen der Mechanik und Physik*. Since the two editors were now living as "Jews" in American emigration since 1938 and 1939, Willers' naming them in his review probably did not seem politically opportune. The "Frank-Mises" (see figure 14 below), as the handbook was called, was reprinted in America in 1943 in 1000 copies as a war measure, which reflected the unchanged demand for it (Siegmond-Schultze 2007, 51).

One could alternatively interpret Willers' review as a subtle attempt to resist the regime by showing his peers the grotesqueness of the political situation. It was also clear that Riemann's historical book was of much less importance to ZAMM readers than the "Frank-Mises."

Die Differential- und Integralgleichungen

der Mechanik und Physik

herausgegeben von

Dr. Philipp Frank und Dr. Richard v. Mises
o. Professor an der Deutschen Universität in Prag o. Professor an der Universität Berlin

2. vermehrte Auflage

zugleich 8. Auflage von Riemann-Webers Partiiellen
Differentialgleichungen der mathematischen Physik

Published and distributed in the public interest by authority
of the Alien Property Custodian under license No. A-93.

Publisher: MARY S. ROSENBERG, Book-Seller and Importer
235 West 108th Street • New York 25, N. Y.

1943

HA LIB

FIGURE 14 The "Frank-Mises" as an American reprint from 1943 under war conditions

Other book reviews in ZAMM were more political in nature. Right after Trefftz's death, Willers had published Trefftz's rather dismissive review of the book *Deutsche Physik* (1936) by the elderly Nobel Prize winner and Nazi physicist Philipp Lenard (1862–1947). There it says:

"Anyone who is used to approach the problems of mechanics from the side of its technical applications should not expect to find in this volume the mental tools for the work of the day. The choice of material and presentation are strongly influenced by the author's pronounced aversion to theoretical physics and mathematics." (ZAMM 17: 58)

A thorough assessment of the impact of the Nazi regime on the journal ZAMM cannot be given in this article. The paper is primarily dedicated to RvM, who followed developments in the 1930s from the distance of emigration.

There is no doubt that the enormous expansion of engineering research institutes and armament factories after 1933 could only increase the importance of ZAMM for the regime as a whole. As Willers' editorial at the re-launch of ZAMM in the Russian sector of Berlin in 1947 shows, the topics published by ZAMM had shifted strongly in recent years towards "practical analysis and mechanics of solid and deformable bodies" (see below). This did not mean that the theoretical development of mechanics came to a standstill under wartime conditions. In a review of the book *Theoretische Einführung in die Gasdynamik* (Theoretical Introduction to Gas Dynamics) by Robert Sauer (1943), for example, Adolf Busemann wrote:

"While German books on gas dynamics have so far been written by mechanical engineers, this is the first time that an applied mathematician has had his say. He has worked through, compiled and supplemented the original literature in accordance with his competence in the theoretical-mathematical treatment of the subject matter, dispensing with the physical and metrological questions." (ZAMM 23: 299)

Of course, during the war years, the "pride in the German armed forces" and the role of science in the war occasionally had to be reflected in ZAMM. In a review of the reprint of the book by Carl Cranz and O. von Eberhard *Die neuzeitliche Entwicklung der Schusswaffen* (The modern development of firearms, 1939), the Berlin TH Professor Rudolf Rothe wrote in 1941:

"When we read in an army report today that our long-range guns shot an enemy ship out of a convoy from the Flemish coast, a good deal of such precision can be attributed to both the exact methods of today's ballistics and the technical level of our firearms." (ZAMM 21: 61)

One may nevertheless assume that ZAMM as a whole was less affected by ideological aspects in its work than the society GAMM, where the membership was "purged" of the last Jews around 1938.⁹¹

Instead of a history of ZAMM under the Nazi regime, the final aim of this Section is to pay tribute to a voice of reason that might otherwise perhaps be forgotten, especially since the German language of this voice does not facilitate anymore the historical memory.

It is the voice of Erich Mosch (1876-?), a teacher of physics (with a professorship title since 1913) at various grammar schools (Gymnasien) in Berlin, finally from 1931 at the Kaiser-Friedrich-Gymnasium in Berlin-Charlottenburg, from where he retired in 1938.⁹²

In Section 1.5, I have quoted from RvM's emphatic review of one of Mosch's books. This judgment probably helped to entrust Mosch with various book reviews in ZAMM, mostly on the foundations and the philosophy of physics, technology and mathematics. I have counted 22 book reviews by Mosch in ZAMM, beginning in 1937 (shortly before his retirement and thus in anticipation of relative, also political independence) and ending with the last volume of the old ZAMM in 1944. What makes Mosch's reviews remarkable is not only that they are written with insight but also that they were overwhelmingly free from Nazi ideology, often bordering on irony. I now give a few examples of excerpts from Mosch's book reviews:

In the review of the small 51-page book by Claus Hinrich Tietjen *Space or number* (vol. 6 of *School in Reconstruction based on National Reality*)⁹³ with an introduction by Ministerialdirektor Prof. Dr. Vahlen,⁹⁴ Leipzig 1936 (ZAMM 18: 145/146), Mosch criticizes several mathematical definitions as "more emotional-illustrative than logical-correct." (ZAMM 18: 146). Mosch then lets the text speak for itself in its absurdity:

"Using the example of the air raid, the author again develops the thesis that 'the power of the sense of space, and this is the elementary power of the Nordic man, which is shattered by the power of number' (i.e. by the Jewish influence) 'is awakened to new life, for this is the question of the fate of the German people'."

⁹¹ Cf. the Prandtl Papers in the archives of the MPG in Berlin. This discussion must be reserved for a separate publication on the history of the GAMM.

⁹² Renate Tobies (Jena) alerted me to his personal file as teacher which does not give the year of his decease. This can be searched through <https://archivdatenbank.bbf.dipf.de/actaproweb/index.xhtml> (last access June 2020).

⁹³ *Raum oder Zahl* (Schule im Aufbau aus völkischer Wirklichkeit, herausg. von Cl. H. Tietjen, vol. 6.),

⁹⁴ This is the same Vahlen as mentioned above twice.

To leave no doubt about his irony, Mosch ends the review with the words:

“In his review, the reviewer was only able to highlight some of the most important ideas of the work.” (ZAMM 18: 146)

About the German written book *Einführung in die mathematische Logik und die Methodologie der Mathematik* (Introduction to mathematical logic and the methodology of mathematics, Vienna 1937) by the famous logician Alfred Tarski – twice stigmatized as a Pole and Jew in the Nazi Empire – wrote Mosch in 1938:

“The book wants to give those educated people who are interested in the questions of the foundation and structure of mathematics without having any closer relationship to mathematics an idea of that ‘development of mathematics in its depths’ [Entwicklung der Mathematik in die Tiefe] which began about a century ago and has already reached a high degree of perfection.” (ZAMM 18: 256)

One year later, in April 1939, the year the war broke out, ZAMM published a review by Mosch of a book by an emeritus professor at the TH Stuttgart, W. Häbich, entitled *Organisationselemente einer Funktionstechnik* (Organisational Elements of a Functional Technology) of 1938 (ZAMM 19: 122/123). There it says at first:

“The starting point and cause of the investigation were the disturbances that afflict our culture [Kulturkreis] today.”

These were different from previous disturbances in that they

“give the impression of a world epidemic of persecution mania [Verfolgungswahnsinn], which appears as *technical* madness (excessive increase of the speed of production), as *economic* madness (mutual sealing of borders) and as *armament* madness (in the form of active and passive persecution mania).” (ZAMM 19: 122)

Mosch supported Häbich’s analysis, which also reflected obvious phenomena of Nazi society in the pre-war phase, with the following concluding words:

“The clarity with which the author sees the problems, the heartiness with which he tackles them, the individuality of the presentation make the reading of the book enjoyable and profitable even for the non-technician.” (ZAMM 19: 123)

About the book *Das Hauptproblem der Mathematik* (The Main problem of Mathematics) by Max Steck, published in the middle of the war in 1942, Mosch says at first:

“In the opinion of the author, the mathematical research of our time is on the wrong track. It has devoted itself to formalism and logicism. The way of thinking of what he called the ‘German line’, which has its origin in Plato, has had to give way to the ‘Western line’ due to the influence of mainly Jewish researchers ... The main mathematical directions of this Western line are empiricism (Pasch), formalism (Hilbert) and logistics [Logistik] (Husserl - Whitehead - Scholz), whereby he attacks the Hilbert point of view particularly vehemently ... The tone of his explanations is often excessively sharp [reichlich scharf].” (ZAMM 22: 301)

Indirectly alluding to the fact that David Hilbert could in no way be suspected by the Nazis of being of “Jewish origin”, Mosch then makes clear the absurdity of Steck’s argumentation when saying at the end of the review:

“The author concludes his work with the admonition to faithfully administer and multiply, also in mathematics, the heritage that the great Germans and the Aryan researchers thoughtfully gained.” (ZAMM 22: 301)

3 | ASYLUM IN THE U.S. AND RvM's LAST CONTACTS WITH ZAMM

After RvM had arrived in New York from Istanbul on August 17, 1939, he took up his initially unpaid position at the Engineering Department of Harvard University in Cambridge/Boston.⁹⁵ He had had to accept this position in order to be able to enter the United States outside the otherwise strictly limited immigration quota. It soon became apparent that RvM's method in probability theory and statistics – these were his preferred areas of work in Turkish emigration – met with strong resistance among American mathematicians and other emigrants from Europe. These had become, in large part, supporters of the modern paradigm of the Russian A.N. Kolmogorov (from his book of 1933). RvM allegedly said the following about this that was not quite correct and showed that he felt insulted:

“There is here a combination of ignorance and racket with respect to probability. Here I can only do mechanics.”⁹⁶

Mechanics was of course also a central area in the War Preparedness Movement in the United States. Publications in applied mathematics also were in demand, where the United States still lagged behind some countries in Europe, especially Germany.⁹⁷ The entry of the USA into the war in December 1941 created new conditions. The fact that the entire ZAMM was photomechanically reprinted from its first volumes under war conditions in the United States around 1943 under the Alien Property Custodian (APC) is certainly also an expression of the increased demand for this type of journal.⁹⁸

3.1 | RvM's failed collaboration with an American journal in the tradition of ZAMM: the “Quarterly of Applied Mathematics”

The APC program of course only concerned the reprinting of European publications, generally in original languages. But there were also initiatives for new, American publication projects. Already since February 1940 there had been contacts between RvM and von Kármán about a new journal for applied mathematics. As reported above, von Kármán had been working on the other side of the American continent at the California Institute of Technology for over 10 years. RvM told von Kármán on February 10, 1940, among other things, that a publisher had suggested to him that he publish, together with von Kármán, an American successor to ZAMM:

“1) the eventual new foundation should be international, not purely American; 2) it should include applied mathematics (like the ZAMM), for which there is no organ in America; 3) it should be intended for longer work with mathematical derivations that are not included in Applied Mechanics [the existing American journal, RS]. ... Incidentally, I am by no means ‘eager’ and have been completely passive in this matter so far.”⁹⁹

Von Kármán reacted somewhat skeptically in his English reply letter of February 19, probably also alluding to RvM's rather short experience in the U.S.:¹⁰⁰

“As far as the project is concerned, I am somewhat worried about the future of a journal published by a newly Americanized publisher and editors of such outspoken European direction. If you want to do something in this direction, I believe the most important thing would be to get a young American scientist who could act as managing director and would do the work. If you have someone who is really good and is willing to devote his time to this task, we could talk over the chances of such a venture.” (Kármán Papers, 20.37).

⁹⁵ (Siegmond-Schultze 2009, 383ff)

⁹⁶ (Siegmond-Schultze 2018, 518), as quoted by Hilda Geiringer.

⁹⁷ (Siegmond-Schultze 2003).

⁹⁸ The reprint of ZAMM (without translation) and other German journals under the APC from 1943 onwards is historically documented (Siegmond-Schultze 1997, 157). The reprints of ZAMM by the Johnson Reprint Corporation “with permission of the original publisher”, which can be found, for example, in the library of the Otto-Guericke-University Magdeburg for volumes 11–20, must have been published independently of the American war program and earlier, since the Americans would undoubtedly not have asked the war opponent Germany for permission in 1943. I thank the editor Holm Altenbach for this information. Cf. also figure 14 above with the reprint of the “Frank-Mises” (1943).

⁹⁹ “1) soll die event. Neugründung eine internationale, nicht rein amerik. sein; 2) Würde sie die angew. Mathematik umfassen (wie die ZAMM), wofür es in Amerika überhaupt kein Organ gibt; 3) wäre sie für längere Arbeiten mit mathematischen Ableitungen bestimmt, die in Appl. Mech. gar nicht aufgenommen werden. ... Im Übrigen bin ich keineswegs ‘eager’ und war bisher in der Sache völlig passiv.” (Kármán Papers, 20.37)

¹⁰⁰ RvM only became an American citizen in January 1946. Mises Papers, HUG 4574.105, box 1.

For reasons that have not yet been fully clarified, RvM and von Kármán were unable or unwilling to pursue their plans to found a journal in 1940/41. A letter from RvM to von Kármán dated September 2, 1942, speaks of “endless intrigues that have been playing at this matter for a year” and of the intention of some Americans “not to let either of us become too powerful.”¹⁰¹ The project of an American ZAMM was instead actively pursued at Brown University in Rhode Island, especially by the former longtime Secretary of the AMS R.G.D. Richardson. This eventually led to the founding of the *Quarterly of Applied Mathematics* in 1943. A letter to Richardson from John L. Synge, an applied mathematician from Ireland and working in Toronto, dated August 1942, was part of these preparations, and shows the role of ZAMM in the background, not least in the naming of the *Quarterly*:

“The ZAMM is taken as model, but do not the initials QAMM make that a little too obvious? I don’t see the necessity for putting Mechanics as well as Mathematics in the title, unless the idea is to include experimental results in Mechanics. I would think Applied Mathematics Quarterly or Quarterly of Applied Mathematics would fill the bill.”¹⁰²

Richardson wrote to Warren Weaver, the head of the American “Applied Mathematics Panel” (APM), on September 24, 1942:

“We found that von Kármán is willing to serve as an editor, if we start the journal and that he is entirely independent of von Mises.”¹⁰³

While the recently immigrated RvM apparently had problems adapting to American society and to the American mathematical culture, Theodore von Kármán, who had long American experience, did not consider it beneath his dignity to appear on the editorial board of the *Quarterly of Applied Mathematics* (from 1943) as one of many editors.

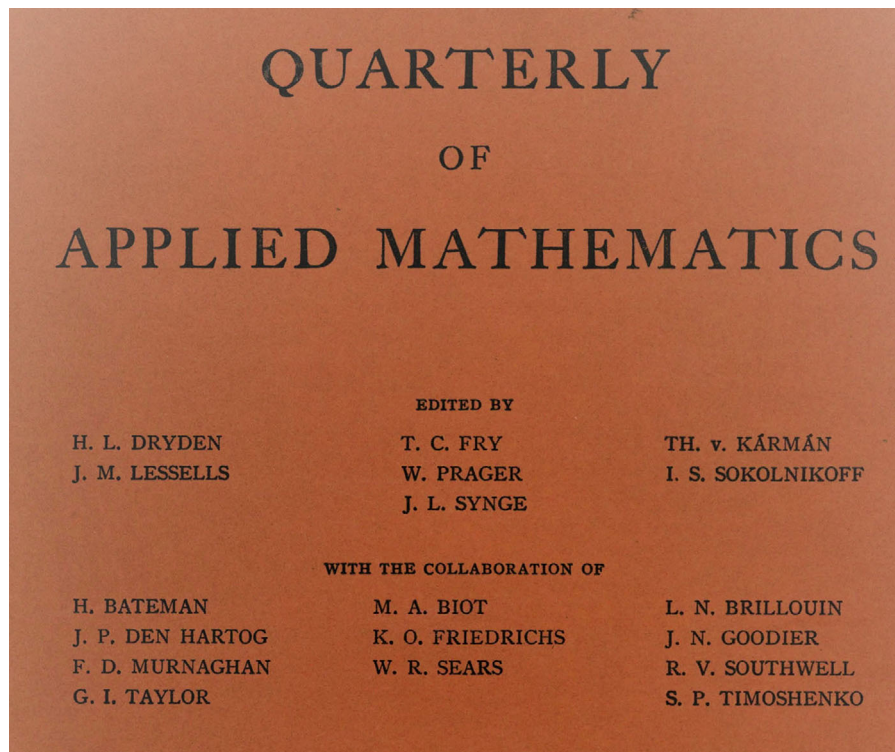


FIGURE 15 First Title Page (1943) of *Quarterly of Applied Mathematics* (top)

¹⁰¹ “endlosen Intriguen, die seit einem Jahr in dieser Sache spielen” and “Absicht ... uns beide nicht zu mächtig werden zu lassen.” Kármán Papers, 20.37, Mises to von Kármán, September 2, 1942.

¹⁰² BUA, Applied Mathematics Division, I.76. J.L. Synge to Richardson, August 25, 1942.

¹⁰³ BUA, Applied Mathematics Division, I.84 (W. Weaver).

Richardson tried in vain to persuade RvM to join the board of editors. In a letter to RvM, dated September 14, 1942, he reacted to a previous letter in which RvM had apparently complained about the very large board of editors for the planned journal *Quarterly of Applied Mathematics*, fearing lack of opportunities for individual editors to influence decisions. In order to convince RvM, Richardson stressed the national and patriotic importance of the planned journal and pointed to differences in attitudes between Europeans and Americans:

“I believe that there is a considerable difference between the situation here and in Europe and that policies which would be successful in one country might easily be failures in others. Here in America we manage things by cooperation . . . general policies are laid down by a group and not by an individual. . . . My own desire is to make it possible to use all the talent we have in America in this terrible struggle for the existence of civilization.” (Siegmond-Schultze 2009, 246)

RvM wrote a rather critical and detailed review of the first issue of the journal in the widely distributed American journal *Science* (Mises 1944). This document, which cannot be analyzed in detail here, is important for a biography of RvM, and contains, among other things, interesting historical comparisons between German and American applied mathematics. Although the title of the *Quarterly of Applied Mathematics* deliberately – at the suggestion of Synge and others – did not mention mechanics, RvM found that

“the whole program is focused on ‘tooling up mathematics for engineering.’ Papers on probability, statistics, economy, biology seem practically excluded.” (Mises 1944, 81)

RvM alluded to the brilliant article by von Kármán with which the new *Quarterly* opened (Kármán 1943), which, however, cannot be compared either in content or in scope with RvM’s introductory article for ZAMM 22 years earlier (Mises 1921). RvM does not mention that von Kármán was the author of this article, but then clearly recognizes his old friend and competitor as a specialist in aerodynamics, not an applied mathematician in RvM’s broad understanding:

“In the board of editors, which includes Th. von Kármán, leading man in aeronautical research, none of the country’s representative mathematicians is listed.” (Mises 1944, 81/82)

As the “most interesting contribution so far” in the *Quarterly*, RvM does not coincidentally consider an article by two students of his former student Stefan Bergmann, “L. Bers and A. Gelbart, on certain differential equations in mechanics” (Mises 1944, 82). RvM felt a certain degree of over-organization in the *Quarterly* and said:

“History has taught that the best, if not the only, way to promote scientific achievements is to leave people who are able to do creative work to themselves and to protect them as far as possible against all kinds of organizers and inciters.” (Mises 1944, 82)

3.2 | The reappearance of ZAMM after WWII and last contacts of the von Mises-Geiringer couple with the journal in connection with the birthday-memorial issue of 1953

In April 1947, 2 years after the war, ZAMM reappeared as the first German mathematical journal in Berlin with a license from the Soviet military administration. RvM’s former university, soon to be called Humboldt University, was now located in the Russian sector of Berlin. Willers, the now already 64-year-old editor, said in an editorial, among other things, alluding to the until recently prevailing conditions of armament war (see figure 16):

“In the future, the journal will be published monthly in 32-page issues. In the new volumes the journal will not only, as it was the case in the last years, publish articles mainly from the fields of practical analysis and the mechanics of solid and deformable bodies, but also from other fields, e.g. electrical engineering, thermodynamics, optics, geodesy, statistics etc., if they contain mathematically interesting ideas. The journal is to

become as comprehensive as the first volumes were. In the last years the emphasis was on mechanics. In the future the applications of mathematics shall be the main focus.” (ZAMM 27: 1)

ZEITSCHRIFT FÜR ANGEWANDTE MATHEMATIK UND MECHANIK

INGENIEURWISSENSCHAFTLICHE FORSCHUNGSARBEITEN

Band 25/27 April 1947 Heft 1

Zum Wiedererscheinen der „Zeitschrift für angewandte Mathematik und Mechanik“.

*N*ach zweijähriger Unterbrechung erscheint mit vorliegendem Heft 1 des Bandes 25/27 die „Zeitschrift für angewandte Mathematik und Mechanik“ wieder in der alten bewährten Anordnung und Form. Das letzte Heft vor dem Zusammenbruch war das Doppelheft 5/6 des Bandes 24, das Ludwig Prandtl zum 70. Geburtstag gewidmet war. Heft 3 und 4 dieses Bandes waren zwar vorbereitet, konnten aber nicht mehr gedruckt werden. Dieser Band bleibt also unvollständig.

Künftig wird die Zeitschrift monatlich in Heften von 32 Seiten Umfang erscheinen.

In den neuen Bänden will die Zeitschrift nicht nur, wie es in den letzten Jahrgängen der Fall war, Aufsätze in der Hauptsache aus den Gebieten der praktischen Analysis und der Mechanik fester und deformierbarer Körper bringen, sondern es sollen auch Arbeiten aus anderen Gebieten, z. B. der Elektrotechnik, der Thermodynamik, der Optik, der Geodäsie, der Statistik usw. aufgenommen werden, falls sie mathematisch interessante Gedankengänge enthalten. Die Zeitschrift soll wieder so umfassend werden, wie es die ersten Jahrgänge waren. In den letzten Jahren lag das Schwergewicht auf der Mechanik. In Zukunft sollen die Anwendungen der Mathematik im Vordergrund stehen.

Der neue Verlag hat die Lizenz für die „Zeitschrift für angewandte Mathematik und Mechanik“ am 27. 2. 1947 erhalten. Seine umfangreiche wissenschaftliche Verlagsproduktion, vor allem auch auf verwandten Gebieten, gibt der „Zeitschrift für angewandte Mathematik und Mechanik“ das sichere Fundament für eine stete Aufwärtsentwicklung.

Wir bitten nun alle Fachgenossen des In- und Auslandes um ihre Mitarbeit, damit der Zeitschrift im Interesse der internationalen Wissenschaft ihre alte geachtete Stellung erhalten bleibt.

Der Verlag.

Der Herausgeber.

FIGURE 16 Willers' Editorial 1947 (ZAMM 27: 1)

In 1956, after another scant decade in which the volume of the journal had gradually risen to pre-war levels,¹⁰⁴ Willers described the transition from war to post-war as follows:

“During the Second World War, due to the lack of paper, the issues gradually became thinner, and finally the journal had to cease publication altogether. The last issue was volume 24, issue 5 / 6, which was dedicated to Prof. L. Prandtl on his seventieth birthday. The two previous issues had been destroyed by aerial bombs during transport from the printing house to the publishing house and could therefore not be delivered. The remainder of the remaining issues also burned up during the fights around Berlin.” (Willers 1956, 121)

Willers then added that the intention of thematic breadth announced in 1947, which may in part have reflected the political limitations of mechanical research in the immediate post-war period,¹⁰⁵ could not quite be realized – probably due to the increasing specialization in scientific journals:

“Since, as mentioned above, special journals had been created for some of the areas previously covered by the journal, ZAMM now mostly published only papers from the fields of practical analysis, mathematical statistics, and the mechanics of solid, liquid, elastic, and plastic bodies. These are still the main areas of publication. Recently, papers on the computational technology of calculating machines and their construction have been added. ... Most of the issues are sent to non-German-speaking countries.” (Willers 1956, 122/123)

¹⁰⁴ Beyond the $12 \times 32 = 384$ pages per year, envisaged in the 1947 editorial. In recent times the yearly edition of ZAMM has often transgressed 1000 pages.

¹⁰⁵ The Allied Control Council (1945–1949) restricted among other things certain areas of war-related research.

Most of Willers' editorial principles have been retained over several decades.¹⁰⁶ The impact of the political and geographical division of Germany from 1949, which also caused problems for the communication between GAMM and ZAMM appearing in the GDR, must be reserved for a separate historical account. The role of Richard von Mises as founder of ZAMM has always been emphasized on the title page. Since the 1980s English began to dominate as the language of publication in ZAMM. From the new millennium online publication set in gradually. From 2017 ZAMM appears exclusively online and there is no regular print version anymore, "print on demand" being offered.

Some remarks about the last contacts with ZAMM of the von Mises-Geiringer couple in American emigration may conclude this overview article:

After the war there was just one more publication by RvM in ZAMM which appeared posthumously (Mises 1954).¹⁰⁷ Geiringer published twice in ZAMM after the war, 1952 on plane plasticity theory and 1953 on applications of statistics to genetics (Geiringer 1953).¹⁰⁸ The latter paper was part of another birthday issue of ZAMM for RvM, this time on the occasion of his 70th birthday. The idea for it had originated around 1951, with significant input from Geiringer.

Stefan Bergman, the former co-worker of RvM at ZAMM, now working in America and written with only one n, had spoken of his political concerns in a letter to Geiringer on December 30, 1951:

"Concerning the tribute to Mises, the idea of arranging an issue of ZAMM does not seem to me to be very recommendable: ZAMM appears in the Russian zone¹⁰⁹ and it may well happen that as a result of some political incident the whole thing would be prevented and all the preparatory work would be in vain. And besides, articles about pure mathematics and probability theory cannot be published in ZAMM. I personally think that a special volume would actually be preferable. . . . Would you agree that we form a kind of committee where you are the driving force?"¹¹⁰

Bergman's political concerns were finally shared by Geiringer. She wrote to Günter Schulz on October 12, 1952, her colleague at Berlin University in the 1920s:

"I am indeed quite sad, because just now, after everything is finished, after a long time of work, when I wanted to send the ms. to Mr. Willers, it occurred to me with horror that a paper on Mendel's biology might be 'intolerable' in the Russian zone. Since I do not want Mr. W. to have any difficulties under any circumstances, I take the liberty of involving you again. . . . Do you think that the publication is possible (possibly after omitting the name 'Mendel' in all places)?"¹¹¹

Geiringer's concerns finally proved to be unfounded, and her German contribution (Geiringer 1953) entitled "Some problems of Mendelian genetics. R. v. Mises on his 70th birthday" appeared uncensored in the birthday issue for RvM. Geiringer's address was given as "Norton (Mass.)", pointing to her position at a small American college near Boston, which was completely inadequate to her importance and was above all a sign of continued suppression of women in academia.

The anniversary volume favoured by Bergman was finally published under the title *Studies in Mathematics and Mechanics Presented to Richard von Mises by Friends, Colleagues, and Pupils* (Birkhoff/Kuerti/Szegö 1954) and was much more representative than the ZAMM issue of 1953, containing 43 articles by 49 authors from many different countries. However, the book planned as a birthday present for RvM had become a commemorative volume, which was published posthumously in 1954.

¹⁰⁶ See remarks on the post-war development of ZAMM in the editorial by the current editor (Altenbach 2020a).

¹⁰⁷ See Collatz's comments on this paper above in Section 1.3.

¹⁰⁸ Cf. the bibliography of Geiringer's works in (Binder 1992, 47–51).

¹⁰⁹ In fact the German Democratic Republic (GDR) had been founded in October 1949, and ZAMM appeared now in the Eastern part of Berlin.

¹¹⁰ "Bezüglich Ehrung für Mises scheint mir die Idee ein Heft der ZAMM zu arrangieren nicht so sehr empfehlenswert: ZAMM erscheint in der russischen Zone und es mag wohl passieren dass infolge irgend eines politischen Zwischenfalls die ganze Sache verhindert wäre und die ganze Vorbereitungsarbeit umsonst wäre. Und außerdem können Artikel über reine Mathematik und Wahrscheinlichkeitstheorie in ZAMM gar nicht veröffentlicht werden. Ich persönlich denke, dass ein besonderer Band eigentlich vorzuziehen wäre. . . . Würden Sie zustimmen dass wir so eine Art Komitee bilden in dem aber doch Sie die Treibfeder [sic] sind.?" Mises Papers, HUG 4574.5. box 11, folder "Anniversary Volume."

¹¹¹ "Ich bin in der Tat ziemlich betrübt, denn gerade jetzt nachdem alles fertig ist, nach langer Arbeit, und ich das Ms. an Herrn Willers schicken wollte, fiel mir mit Schrecken ein, dass eine Arbeit über Mendelsche Biologie vielleicht in der russischen Zone 'untragbar' ist. Da ich auf keinen Fall will, dass Herr W. Schwierigkeiten hat, habe ich mir wieder erlaubt, Sie dazwischen einzuschalten. . . . meinen [Sie], dass die Veröffentlichung in Betracht kommt (eventuell nach Weglassung des Namens 'Mendel' an allen Stellen)?" Mises Papers, HUG 4574.5. box 11, folder "Anniversary Volume."

While RvM still lived to see the ZAMM issue of April 1953, he and Geiringer were disappointed with it. In addition to Geiringer's, it contained only eight articles by exclusively German authors, including Collatz, Iglisch and Schmieden, the former students, and RvM's former boss Hamel, with whom he had some controversy in the 1920s and whose behavior under the NS RvM disapproved. Geiringer wrote on February 10, 1953 to her colleague and former acquaintance Alfred Basch in Vienna, who had contributed to the extensive anniversary volume but not to the ZAMM issue, and said that she had hoped for Austrian contributions. On the same day she wrote again to Schulz, this time because of the small number of German contributions:

“I can't explain it, because when we were in Germany [in 1951, RS] it seemed as if many of the former students were still very devoted to Mises. Here in the U.S. there is much talk of a new and strong awakening of Nazi ideology in Germany. I hope this is all exaggerated.”¹¹²

The applied mathematicians Richard von Mises and Hilda Geiringer, who had been expelled from Europe, did not feel completely welcome in the new country, nor sufficiently appreciated in the countries of their origin.

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APPENDIX: Richard von Mises’ letter from October 1933, asking his former doctoral student Erich Trefftz to take over as editor of ZAMM (translation, German original below)

Letter Head ZAMM, Berlin October 17, 1933, 2 pages type-written, University Archives Technical University Dresden, Trefftz Papers

“Dear Trefftz!

Yesterday, I spoke with Prof. Matschoss about the future of the Zamm. The VDI and the VDI-Verlag are determined not to let the journal go down now. However, since it is not possible, both for practical and legal reasons (the editor must

be resident in Germany), that I continue to run the journal, a new publisher must be found. We could not [konnten keinen]¹¹³ find anyone more suitable than you [Dich], and I would now like to urge you to take over this task. I believe that the work you will have with it is not so great that it will not be compensated by the satisfaction of success. Mr. Matschoss and Mr. Nägel both attach great importance to the fact that you will be my successor. I recently talked to Prandtl about the matter and he is interested in the continued existence of the journal, but he has shown no willingness to take it over.

I will probably be leaving at the end of this month, but I will still be doing all the work for the last issue of the year myself. The formal transition to the new editorial office should take place with issue 1 of the new volume. On the other hand, it is not necessary that you take over the whole work immediately if it is too much for you at first. My secretary, who has been completely familiar with the matter for years, could continue the business of the editorial office under your and my direction for the time being. Since there is a lot of material available, both in accepted works and in texts already in typesetting, prepared figures, book reviews, etc., a certain after-effect of the old editorial office would continue for the time being. I believe that I will be able to do the necessary business in writing from Istanbul. I have no doubt that we will be able to reach an easy agreement on how to work in the transitional period, once you have decided, as I hope, to run the editorial office on your own later.

In any case, it would be very desirable, indeed necessary, for you to come here before my departure, so that we can discuss matters on the one hand and the agreement between you and the VDI-Verlag on the other. I am especially glad that I will have the opportunity to see you before I move. Please be so kind and answer me as soon as possible in the affirmative sense.

Greetings
Your [Dein] Mises”

German original:¹¹⁴

“Herrn Prof. Dr. E. Trefftz, Dresden – A., Kulmstr.1
Lieber Trefftz!

Ich habe gestern mit Prof. Matschoss über die Zukunft der Zamm gesprochen. Der VDI und der VDI-Verlag sind entschlossen, die Zeitschrift jetzt nicht eingehen zu lassen. Da es jedoch nicht möglich ist, sowohl aus praktischen wie aus gesetzlichen Gründen (der Herausgeber muss seinen Wohnsitz im Inland haben), dass ich die Zeitschrift weiterführe, muss ein neuer Herausgeber gesucht werden. Wir konnten keinen Geeigneteren finden als Dich, und ich möchte jetzt an Dich die dringende Bitte richten, diese Aufgabe auch zu übernehmen. Ich glaube, dass die Arbeit, die Du damit haben wirst, nicht so gross ist, dass sie nicht durch die Befriedigung eines Erfolges wettgemacht wird. Herr Matschoss und Herr Nägel legen beide ebenfalls grössten Wert darauf, dass Du mein Nachfolger wirst. Mit Prandtl habe ich vor kurzem über die Sache gesprochen und er hat sich wohl an dem Weiterbestand der Zeitschrift interessiert gezeigt, aber keinerlei Bereitwilligkeit bewiesen, sie zu übernehmen,

Ich verreise wohl noch Ende dieses Monats, werde aber jedenfalls alle Angelegenheiten für das letzte Heft des Jahrgangs noch selbst erledigen. Der formelle Uebergang an die neue Redaktion müsste mit Heft 1 des neuen Jahrgangs erfolgen. Andererseits ist es nicht notwendig, dass Du sofort die ganze Arbeit übernimmst, wenn es Dir zunächst zu viel ist. Meine Sekretärin, die seit Jahren in die Sache völlig eingearbeitet ist, könnte hier die Geschäfte der Redaktion unter Deiner und meiner Leitung zunächst noch weiterführen. Da im übrigen viel Material sowohl an angenommenen Arbeiten wie an bereits im Satz befindlichen Texten, vorbereiteten Figuren, Buchbesprechungen usw. vorliegt, würde ja für die erste Zeit auch noch eine gewisse Nachwirkung der alten Redaktion fortbestehen. Ich glaube, dass ich die in diesem Rahmen erforderlichen Geschäfte schriftlich von Istanbul aus werde erledigen können. Ich zweifle nicht daran, dass wir uns über die Arbeitsweise in der Uebergangszeit leicht verständigen werden, wenn Du Dich erst einmal entschlossen haben wirst, wie ich hoffe, die Redaktion später allein zu führen.

Auf jeden Fall wäre es sehr erwünscht, ja eigentlich notwendig, dass Du noch vor meiner Abreise hierher kommst, damit wir einerseits die Angelegenheiten besprechen und andererseits die Vereinbarung zwischen Dir und dem VDI-

¹¹³ The letter shows clearly “konnten keinen”, not “könnten keinen”, which would be the more flattering version meaning “could not possibly find.” See Figure 8a above. But the more factual “konnten keinen” underscores the severity of the situation better.

¹¹⁴ See also the excerpts in Figures 8a and 8b above.

Verlag geschieht. Ich freue mich besonders, dass ich auf diese Weise noch Gelegenheit haben werde, Dich vor meiner Uebersiedlung zu sehen. Sei so gut und antworte mir möglichst bald im zustimmenden Sinne.

Mit den besten Grüßen
Dein Mises”