

Preface to volume II

This second volume concludes the edition of Ernst Zermelo's collected works. The volume focuses on his contributions mainly to analysis and physics. Except for an excursion into physical chemistry (*Riesenfeld and Zermelo 1909*), the papers come from the decade around 1900 when Zermelo was in Berlin and Göttingen and about two years around 1930 when he was in Freiburg. They are accompanied by three items found in Zermelo's and in David Hilbert's *Nachlass*. For orientation especially about the personal circumstances accompanying the genesis of the papers, the volume starts with Zermelo's *curriculum vitae*, the one given in volume I.

Zermelo's works of an applied character may hold pioneering ideas and insights, but they did not receive the attention they deserved. One reason may be the sheer diversity of topics he treated. Of course, one should also take into consideration that starting soon after the turn of the century his mathematical work shifted elsewhere for more than two decades, to set theory and mathematical logic, research in these disciplines leading him to his most influential scientific achievements.

The Berlin-Göttingen period comprises three topics: the calculus of variations, the kinetic theory of gases, and hydrodynamics.

The engagement with the calculus of variations started with his Ph. D. thesis (*1894*), written at the University of Berlin under the guidance of Hermann Amandus Schwarz.

The engagement in the kinetic theory of gases started in 1896, also in Berlin, when Zermelo became an assistant to Max Planck. It lasted for about ten years. Its best-known part, a controversy with Ludwig Boltzmann, is described and analyzed here in full with the inclusion of *Boltzmann 1896, 1897*.

Zermelo's interest in meteorology led him to hydrodynamics, work that culminated in his 1899 *Habilitation* thesis (*1902a, s1902b, s1902c*) in Göttingen.

In the late 1920s, Zermelo came back to his "old, even though mostly unhappy love for the 'applications'". The starting paper (*1928*) on the evaluation of chess tournaments, with its early use of the maximum likelihood method, was to remain unknown until several decades later other people rediscovered his methods and results. Motivated by the circumnavigation of the earth by the airship Graf Zeppelin in August 1929, Zermelo wrote two papers (*1930c, 1931a*) on optimal steering methods of airships. Soon, however, this return to mathematics of an applied character came to an end when Zermelo got involved in a serious foundational debate which fully occupied what strength was left him after a serious illness.

The introductory notes are a crucial part of the Zermelo edition. Those who agreed to comment on a paper or a group of papers in this volume generously

shared their experience and knowledge with us and the potential reader. We at times had involved discussions toward securing the most informative and accurate presentations, and we appreciate the professionalism that was brought to bear.

The translations of the original papers were carried out by Enzo de Pellegrin. We again admire his extraordinary care and his feeling for both languages when handling Zermelo's style with its richness in nuances and its involved sentential structures. The introductory notes of Rüdiger Thiele were translated by David Kramer who with diligence and care successfully mirrored the style of the original German.

We express our gratitude to all who have supported us during our work. In this connection we would like to mention Ruth Allewelt from Springer-Verlag, Andrea Köhler and Petra Möws of Le-Tex Publishing Services, and Marlies Würth, the librarian of the Freiburg Mathematical Institute.

Again, Martin Peters of Springer-Verlag was ready to offer valuable help and advice.

We appreciate that Craig Fraser, while not being able to continue with his participation in the edition, was ready to contribute two substantial introductory notes.

Freiburg and Boston
December 2012

Heinz-Dieter Ebbinghaus
Akihiro Kanamori

