Preface

This monograph is devoted to two distinguished mathematicians, Karl Löwner (1893–1968) and Lipman Bers (1914–1993). It recalls their personal, moral and ethical views, which merit our respect and even admiration, and summarizes their mathematical achievements before their emigration to the USA. This backward glance reveals how the academic milieu and the development of science are strongly interwoven with the political situation and prevailing attitudes in society.

The first chapter begins with a detailed description of Karl Löwner's life, and his teaching and research activities at the German Technical University in Prague, the German University in Prague,[1] the University of Berlin and the University of Cologne before his emigration to the USA in 1939. Löwner's professional achievements during this period, which proved to be important for his future career, is presented in the context of a complicated political situation and against a background of development of mathematics in Czechoslovakia and, more generally, in Europe. The text is based on an archival search[2] and the study of materials published in books, journals, research monographs, textbooks and newspaper articles. Most of the archival findings are published here for the first time. Some information was gathered through family memoirs and recollections of Löwner's colleagues, friends and students. The life story of Charles Loewner[3] after his emigration to the USA is outlined only briefly.

[1] In 1882, *Charles-Ferdinand University in Prague*, originally Charles University (founded in 1348 as the first university in Central Europe), was split into two parts: the Czech University and the German University. The German University flourished before World War I, when it was the home of well-known scientists (such as physicists Ernst Mach and Albert Einstein, zoologist Karl Isidor Cori, lawyer Ludwig Spiegel, theologian August Naegle, philosophers Christian Ehrenfels and Oskar Kraus, and Indologist Moritz Winternitz). On 17th November 1939, the Czech University and all other Czech higher-education institutions were closed by Nazis, originally for three years. However, they remained closed until the end of World War II. In the spring of 1939, after the Nazi occupation of the Czech lands, the German University was officially renamed the *Deutsche Karls-Universität in Prag*. On 1st September 1939, it was directly subordinated to the *Reichsministry of Education in Berlin* and on 4th November 1939 it was proclaimed to be *Reichsuniversität*. Teaching at the German University took place until the end of World War II. In May 1945, the German University in Prague was abolished by Czechoslovak authorities.

[2] The archival materials documenting Löwner's life and work are stored in archives and libraries in Prague, Berlin, Cologne, Oxford and Stanford.
The materials related to Karl Löwner and his attempt to escape from occupied Europe are deposited in the files of the *Society for the Protection of Science and Learning* (SPLS), box 282, file Karl Löwner, folio 121–179, Department of Special Collections, Radcliffe Science Library, Bodleian Library, Oxford, Great Britain. Basic information can be found on the www page http://www.rsl.ox.ac.uk/dept/scwmss/wmss/online/modern/spsl/spsl.html.
Some information on the legacy of K. Löwner (*Charles Loewner Collection*, Charles Loewner Papers, SC 104, Department of Special Collections, Green Library, Stanford University Libraries, Stanford, California, USA) can be found in the articles R. Finn, R. Ossermann: *Loewner Archive Established*, Notices Am. Math. Soc. 56(2009), p. 210, I. Netuka: *Zpřístupnění Loewnerova archivu* (Czech) [Making Loewner's Archive accessible], Pokroky matematiky, fyziky a astronomie 54(2009), pp. 173–174, and on the www page http://www-sul.stanford.edu/depts/spc.

[3] His original name was written in the Czech version as Karel Löwner, but among his German friends and colleagues, he was known as Karl Löwner (using the German version of his first name). From 1939 he used only the English version of his name, that is, Charles Loewner.

The next part deals with mathematics and is focused on the scientific achievements of Karl Löwner before his emigration. Up to 1939, Karl Löwner published eight research papers (two of them with co-authors), two preliminary communications, one extensive book review and two chapters in a textbook. We offer a summary of his results, and trace their origin as well as their subsequent development and impact on modern mathematics. There were two main subjects of Löwner's investigations in the pre-war period: geometric function theory and matrix functions. Special attention is paid here to Löwner's most famous work on univalent functions[4] where Löwner's celebrated differential equation was introduced. This marked a new era in geometric function theory, and Löwner's pioneering method remains a source of deep research up to the present day. We note that the proof of the Bieberbach conjecture by Louis de Branges in 1984 also uses Löwner's equation. Unexpectedly, during the last decade, Löwner's method gained recent prominence with the introduction of a stochastic process called SLE (*stochastic Loewner evolution* or Schramm-Loewner evolution). SLE-based research features in two recent Fields Medal citations (W. Werner (2006) and S. Smirnov (2010)).

The third chapter is concluded by bibliography of Karl Löwner, lecture courses and seminars attended by Karl Löwner, lecture courses and seminars delivered by Karl Löwner, Karl Löwner and dissertations at the German University in Prague, and Karl Löwner's lectures to the mathematical community. They reveal Löwner's wide pedagogical activities as well as his scientific interests and results.

The second chapter discusses the life and early mathematical career of Lipman Bers. In particular, it deals with Bers' move from Latvia to Prague and especially with his studies at the German University in Prague. This is based on an archival search and the study of primary and secondary sources. Most archival documents related to Bers' studies in Prague have not been published before. Some information was gathered from memoirs of Bers' colleagues, friends and students. Bers' activities in the USA are described only briefly.

The heart of the second chapter follows. It concentrates on Bers' dissertation on potential theory entitled *Über das harmonische Mass in Raume, Prag, Mai 1938* [Harmonic measure in space, Prague, May 1938], which he wrote and defended under Karl Löwner's supervision. Firstly, a short description of the historical circumstances is given. Then an English translation of the unique archival material is included: the *Harmonisches Mass in Raume. Bericht über eine von der naturwissenschaftlichen Fakultät der deutsche Universität in Prag in Mai 1938 approbierten Dissertation* [Report on the dissertation accepted by the Faculty of Science of the German University in Prague in May 1938 (dated July 1938)].[5] The dissertation itself, which was thought for a long time to be irretrievably lost, was found by Professor L. Bers' son in 2006.[6] The dissertation is carefully analyzed, and detailed mathematical, his-

[4] See the item [L5] in the part *Bibliography of Karl Löwner*.

[5] In 2002, Bers' family came across a report of L. Bers' dissertation and Victor Bers, Professor L. Bers' son, kindly sent it to Prague, to Ivan Netuka, who has a complete copy.

[6] The copy of Bers' dissertation is now available in the Archive of Charles University in Prague.

torical and bibliographical commentaries follow. A reproduction of Bers' *Bericht* is appended to the chapter.

Two reminiscences of Karl Löwner and Lipman Bers written by their children are attached.

Illustrations and copies of selected archival materials and documents are included throughout the text.

The materials from the files of the *Society for the Protection of Science and Learning* (SPSL) have been reproduced by kind permission of the *Council for Assisting Refugee Academics* (CARA). The documents from the *Charles Loewner Collection* have been published by kind permission of the Stanford University Libraries.

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Our text is based on archival documents deposited in the following institutions: the Archive of Charles University in Prague, the Archive of the Czech Technical University in Prague, the Archive of the Academy of Sciences of the Czech Republic, the National Archives of the Czech Republic in Prague, the Prague City Archives, the Archive of Security Forces in Prague, the Military History Archive in Prague, the Jewish Museum in Prague (all in the Czech Republic), the Archive of the Humboldt University in Berlin (Germany), the Archive of the University in Cologne (Germany), the Bodleian Libraries (University of Oxford, Great Britain), the Stanford University Libraries (California, USA), the private Loewner family archive in the USA, and the private Bers family archive in the USA. We also used sources from the following libraries: the National Library of the Czech Republic, the Library of the Academy of Sciences of the Czech Republic, the Library of the Mathematical Institute of the Academy of Sciences of the Czech Republic, the Library of the Faculty of Mathematics and Physics of Charles University in Prague, and the J. A. Komenský Library in Prague (all in the Czech Republic). We are grateful to colleagues at these institutions for their support and assistance in providing archival materials and literature.

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