Preface

In this book the exceptional role of Leonhard Euler in the history of science will be analyzed and emphasized, especially demonstrated for his fundamental contributions to physics. Although Euler is famous as the leading mathematician of the 18th century his contributions to physics are as important and rich of new methods and solutions. There are many books devoted to Euler as mathematician, but not as physicist.

In the past decade, special attention had been directed at the development of science in the 18th century. In three distinguished tercentenary celebrations in occasion of the births of Pierre Louis Moreau de Maupertuis (1698–1759), Emilie du Châtelet (1706–1749) and Leonhard Euler (1707–1783) the merits of these scholars for the development of the post-Newtonian science had been highly acknowledged. These events were not only most welcome to remember an essential period in the past, but are also an opportunity to ask for the long lasting influence on the further development of science until present days.

Euler's contributions to mechanics are rooted in his program published in two volumes entitled *Mechanics or the science of motion analytically demonstrated* very early in 1736. The importance of Euler's theory results from the simultaneous development and application of mathematical and physical methods. It is of particular interest to study how Euler made immediate use of his mathematics for mechanics and coordinated his progress in mathematics with his progress in physics. Euler's mechanics is not only a model for a consistently formulated theory, but allows for generalizations of Euler's principles.

Though his pioneering work on mechanics had an essential influence in the 18th century, its impact on the 19th century was obscured by the overwhelming success of his mathematical writings. Euler anticipated Mach's later criticism of absolute motion and Einstein's assumption on the invariance of the equation of motion in inertial systems. It will be demonstrated that even problems in contemporary physics may be advantageously reconsidered and reformulated in terms of Euler's early unified approach. The interplay between physics and mathematics which appeared in the 18th century will be compared to the development of physics in the 20th century, especially to the development of quantum mechanics between 1900 and 1930.

The reader of Euler's works benefits from his unique ability to preserve mathematical rigour in the analytical formulation of physical laws. The principles and

methods found in the original sources may be advantageously compared to later developments, interpretations and reformulations. The extraordinary power of Euler's program and legacy is due to the successful frontier crossing between different disciplines presented in an exemplarily clear terminology.

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