

Preface

This text is designed to accompany a junior/senior or beginning graduate student course in mechanics for students who have already encountered Lagrange's equations. As the title *Geometric Mechanics* indicates, the content is classical mechanics, with emphasis on geometric methods, such as differential geometry, tensor analysis, and group theory. Courses for which the material in the text has been used and is appropriate are discussed in the Introduction. To reflect a substantial new emphasis in this second edition, compared to the first, the subtitle "Toward a Unification of Classical Physics" has been added. Instead of just laying the groundwork for follow-on, geometry-based, physics subjects, especially general relativity and string theory, this edition contains substantial introductions to both of those topics. To support this, introductory material on classical field theory, including electrodynamic theory (also formulated as mechanics) has been included. The purpose of these "other physics" chapters is to show how, based on Hamilton's principle of least action, *all*, or at least most, of classical physics is naturally subsumed into classical mechanics.

Communications pointing out errors, or making comments or suggestions will be appreciated; E-mail address; talman@mail.lepp.cornell.edu. Because of its complete reorganization, there are undoubtedly more minor errors and dangling references than might be expected for a second edition.

The institutions contributing (in equal parts) to this text have been the public schools of London, Ontario, and universities U.W.O., Caltech, and Cornell. I have profited, initially as a student, and later from my students, at these institutions, and from my colleagues there and at accelerator laboratories worldwide. I have also been fortunate of family; parents, brother, children, and, especially my wife, Myrna.

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