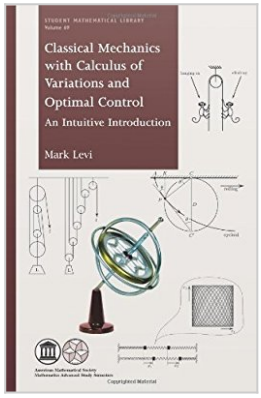

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This is an intuitively motivated presentation of many topics in classical mechanics and related areas of control theory and calculus of variations. All topics throughout the book are treated with zero tolerance for unrevealing definitions and for proofs which leave the reader in the dark. Some areas of particular interest are: an extremely short derivation of the ellipticity of planetary orbits; a statement and an explanation of the "tennis racket paradox"; a heuristic explanation (and a rigorous treatment) of the gyroscopic effect; a revealing equivalence between the dynamics of a particle and statics of a spring; a short geometrical explanation of Pontryagin's Maximum Principle, and more. In the last chapter, aimed at more advanced readers, the Hamiltonian and the momentum are compared to forces in a certain static problem. This gives a palpable physical meaning to some seemingly abstract concepts and theorems. With minimal prerequisites consisting of basic calculus and basic undergraduate physics, this book is suitable for courses from an undergraduate to a beginning graduate level, and for a mixed audience of mathematics, physics and engineering students. Much of the enjoyment of the subject lies in solving almost 200 problems in this book.

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Editorial Review

Review
One of the most valuable aspects of the book -- unfortunately rare among textbooks -- is that we see an author in command of his subject who shares not just the bare facts but how he thinks about them and how all the pieces fit together. --Mathematical Association of America

How do you write a textbook on classical mechanics that is fun to learn from? Mark Levi shows us the way with his new book: "Classical Mechanics with Calculus of Variations and Optimal Control: An Intuitive Introduction." The combination of his unique point of view with his physical and geometrical insights and numerous instructive examples, figures and problem sets make it a pleasure to work through. --Paul Rabinowitz, University of Wisconsin

It is hard to imagine a more original and insightful approach to classical mechanics. Most physicists would regard this as a well-worn and settled subject. But Mark Levi's treatment sparkles with freshness in the many examples he treats and his unexpected analogies, as well as the new approach he brings to the principles. This is inspired pedagogy at the highest level. --Michael Berry, Bristol University, UK

About the Author
Mark Levi, Pennsylvania State University, University Park, PA, USA

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