Classical Mechanics with Mathematica® (Modeling and Simulation in Science, Engineering and Technology)

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This textbook takes a broad yet thorough approach to mechanics, aimed at bridging the gap between classical analytic and modern differential geometric approaches to the subject.? Developed by the author from 35 years of teaching experience, the presentation is designed to give students an overview of the many different models used through the history of the field—from Newton to Lagrange—while also painting a clear picture of the most modern developments. Throughout, it makes heavy use of the powerful tools offered by *Mathematica*?.

The volume is organized into two parts. The first focuses on developing the mathematical framework of linear algebra and differential geometry necessary for the remainder of the book. Topics covered include tensor algebra, Euclidean and symplectic vector spaces, differential manifolds, and absolute differential calculus. The second part of the book applies these topics to kinematics, rigid body dynamics, Lagrangian and Hamiltonian dynamics, Hamilton–Jacobi theory, completely integrable systems, statistical mechanics of equilibrium, and impulsive dynamics, among others.

Unique in its scope of coverage and method of approach, *Classical Mechanics* will be a very useful resource for graduate students and advanced undergraduates in applied mathematics and physics who hope to gain a deeper understanding of mechanics.

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