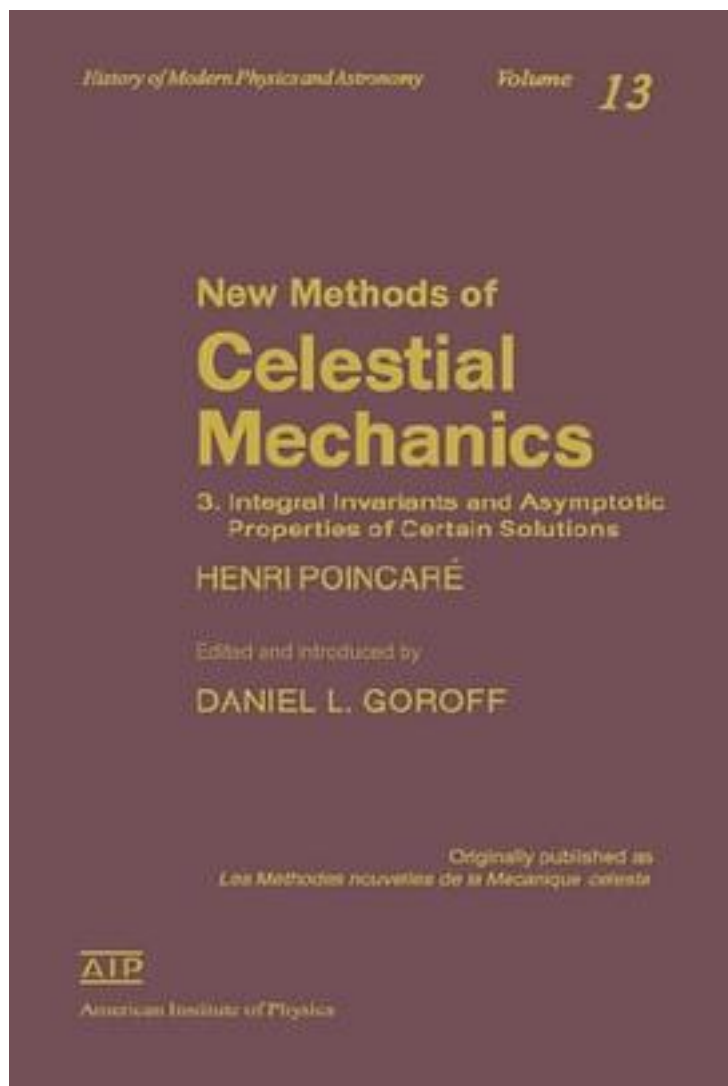


New Methods of Celestial Mechanics (History of Modern Physics)



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Edited by Daniel Goroff, Harvard University This English-language edition of Poincare's landmark work is of interest not only to historians of science, but also to mathematicians. Beginning from an investigation of the three-body problem of Newtonian mechanics, Poincare lays the foundations of the qualitative solutions of differential equations. To investigate the long-unsolved problem of the stability of the Solar System, Poincare invented a number of new techniques including canonical transformations, asymptotic series expansions, and integral invariants. These "new methods" are even now finding applications in chaos and other contemporary disciplines. Contents: Volume I: Periodic and asymptotic solutions: Introduction by Daniel Goroff. Generalities and the Jacobi method. Series integration. Periodic solutions. Characteristic exponents. Nonexistence of uniform integrals. Approximate development of the perturbative function. Asymptotic solutions. Volume II: Approximations by series: Formal calculus. Methods of Newcomb and Lindstedt. Application to the study of secular variations. Application to the three-body problem. Application to orbits. Divergence of the Lindstedt series. Direct calculation of the series. Other methods of direct calculation. Gylden methods. Case of linear equations. Bohlin methods. Bohlin series. Extension of the Bohlin method. Volume III: Integral invariants and asymptotic properties of certain solutions: Integral invariants. Formation of invariants. Use of integral invariants. Integral invariants and asymptotic solutions. Poisson stability. Theory of consequents. Periodic solutions of the second kind. Different forms of the principle of least action.

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