

Energy methods in dynamics

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Abstrak

Energy methods in dynamics is a textbook based on the lectures given by the first author at Ruhr University Bochum, Germany. Its aim is to help students acquire both a good grasp of the first principles from which the governing equations can be derived, and the adequate mathematical methods for their solving. Its distinctive features, as seen from the title, lie in the systematic and intensive use of Hamilton's variational principle and its generalizations for deriving the governing equations of conservative and dissipative mechanical systems, and also in providing the direct variational-asymptotic analysis, whenever available, of the energy and dissipation for the solution of these equations. It demonstrates that many well-known methods in dynamics like those of Lindstedt-Poincare, Bogoliubov-Mitropolsky, Kolmogorov-Arnold-Moser (KAM), Wentzel-Kramers-Brillouin (WKB), and Whitham are derivable from this variational-asymptotic analysis. This second edition includes the solutions to all exercises as well as some new materials concerning amplitude and slope modulations of nonlinear dispersive waves.