Perturbation of Symmetries and Hojman Adiabatic Invariants for Mechanical Systems with Unilateral Holonomic Constraints

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(Received: 2006-5-9; Revised: 2006-9-11)

Abstract: The perturbation of symmetries and adiabatic invariants for mechanical systems with unilateral holonomic constraints are studied. The exact invariant in the form of Hojman led by special Lie symmetries for an undisturbed system with unilateral constraints is given. Based on the concept of high-order adiabatic invariant of mechanical systems, the perturbation of Lie symmetries for the system under the action of small disturbance is investigated, and a new adiabatic invariant for the system with unilateral holonomic constraints is obtained, which can be called Hojman adiabatic invariant. In the end of the paper, an example is given to illustrate the application of the results.

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