Acosta-Humánez, Primitivo B.
Nonautonomous Hamiltonian systems and Morales-Ramis theory. I: The case $\ddot{x} = f(x, t)$.
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Author’s abstract: We present an approach toward the comprehensive analysis of the nonintegrability of differential equations in the form $\ddot{x} = f(x, t)$ which is analogous to Hamiltonian systems with $1 + 1/2$ degrees of freedom. In particular, we analyze the nonintegrability of some important families of differential equations such as Painlevé II, Sitnikov, and the Hill-Schrödinger equation. We emphasize Painlevé II, showing its nonintegrability through three different Hamiltonian systems, and also Sitnikov, in which two different versions including numerical results are shown. The main tool for studying the nonintegrability of these kinds of Hamiltonian systems is Morales-Ramis theory. This paper is a very slight improvement to the talk with a similar title delivered by the author at the SIAM Conference on Applications of Dynamical Systems in 2007.

Reviewer: Nicolai K. Smolentsev (Kemerovo)

MSC:
37J30 Obstructions to integrability for finite-dimensional Hamiltonian and Lagrangian systems (nonintegrability criteria)
12H05 Differential algebra
70H07 Nonintegrable systems for problems in Hamiltonian and Lagrangian mechanics

Keywords:
Hill-Schrödinger equation; Morales-Ramis theory; nonautonomous Hamiltonian systems; nonintegrability of Hamiltonian systems; Painlevé II equation; Sitnikov problem; virtually Abelian groups

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