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Non-resonant phenomena in resonant integrable systems

Hidekazu ITO
Division of Mathematics and Physics
Graduate School of Natural Science and Technology
Kanazawa University
Kakuma, Kanazawa 920-1192
JAPAN

`hideito@kenroku.kanazawa-u.ac.jp`

Abstract

In this talk, we consider the Birkhoff normalization for analytic Hamiltonian systems or symplectic maps. As is well-known, the Birkhoff normal form becomes more complicated when the resonance degree of the fixed point becomes larger. The purpose of this talk is to show that, in case of analytic integrable systems, one can find a convergent Birkhoff normalization so that the normal form in resonant cases may be reduced to a simpler one, i.e., the same form as in non-resonant cases. It is shown that such situations occur in either of the following cases:

(i) when there exist sufficiently many integrals whose number is balanced with the resonance degree;

(ii) when the system is embedded into a parametrized family of generically non-resonant systems.