

NORMALIZATION AND QUANTIZATION OF CLASSICAL HAMILTONIAN SYSTEMS WITH TWO DEGREE OF FREEDOM

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In this report results of investigation some conservative classical integrable and nonintegrable Hamiltonian systems with two degrees of freedom are presented. For all systems considered was calculated Poincaré sections, and for one nonintegrable system found a transition: regularity – chaos – regularity. Also, the conditions under which the system in question is integrable are given.

For all systems The classical Birkhoff-Gustavson normal forms are obtained and its quantum analogues are constructed by the rules of Born-Jordan and Weyl-McCoy, for which the eigenvalue problem is solved and approximate formulas for the energy spectrum are found. For partial values of parameters of quantum normal forms, numerical calculations of lower energy levels are carried out using these formulas, and the results are compared with the known data of other authors. It is found that the best and good agreement with the known results is available when using the Weyl-McCoy quantization rule. However, it is noted that to extend to other systems the advantage of the Weyl-McCoy quantization rule revealed on partial numerical calculations is probably premature.

N. A. Chekanov with heart warmth and gratitude recalls the time when under the professional leadership of Vitaly A. Rostovtsev we developed REDUCE-program[1] for symbolic-numerical normalization of Hamiltonian systems with an arbitrary finite number of degrees of freedom, with which many results obtained and presented in this report.

Литература

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