

## Averaging method and adiabatic invariants

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### Abstract

There are many problems that lead to analysis of Hamiltonian dynamical systems in which one can distinguish motions of two types: slow one and fast one. Adiabatic perturbation theory is a mathematical tool for asymptotic description of such systems' dynamics. This theory allows to construct adiabatic invariants, i.e. approximate first integrals of such systems. These quantities changes only a little on large time intervals, such that variation of slow variables is not small. Adiabatic invariants usually arise as first integrals of averaged over fast dynamics systems. Adiabatic invariants are important dynamical values. In particular, if a system has enough number of adiabatic invariants then the motion over long time intervals is close to regular. On the other hand, destruction of adiabatic invariance lead to chaotic dynamics.

In the lectures methods of adiabatic perturbation theory, some applications of these methods and mechanisms of destruction of adiabatic invariance will be considered.

### References

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