

Singularities of Stability Boundaries of Hamiltonian Systems

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ABSTRACT

Generic singularities of boundaries of stability domains for linear autonomous Hamiltonian systems dependent on one, two and three parameters are studied. A new constructive approach, allowing determining geometry of a singularity of the stability boundary with the use of Hamiltonian matrix, its first derivatives with respect to parameters, as well as eigenvectors and associated vectors at the singularity point, is suggested. Two methods of studying singularities are developed. They are based on the perturbation technique of eigenvalues dependent on parameters and the theory of normal forms (versal deformations) of families of Hamiltonian matrices. Gyroscopic systems as special cases of Hamiltonian systems are investigated. Mechanical examples are given and discussed in detail.

Keywords: *singularity, stability boundary, Hamiltonian system, eigenvalue, bifurcation*

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