



BOOK REVIEW

Multiparameter Stability Theory with Mechanical Applications

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Theory of stability is one of the most exciting chapters in the applied mechanics and mathematics. Indeed, as Budiansky and Hutchinson stated “everybody loves a stability problem”. This is because stability theory is important in all fields of engineering endeavor, beyond the engineering disciplines, it plays a major role in astronomy, biology, celestial mechanics, economics, social sciences, and where not.

I would like to start my evaluation by pointing out from the very beginning that it is a very important and high-quality book. It represents a major contribution to the multi-parameter bifurcation theory of eigenvalues. Since Bolotin’s pioneering book on non-conservative problems in the theory of elastic stability, not many books appeared on such a high level, as this one. It beautifully summarizes the results of the authors’ investigations performed for decades. The authors successfully analyze singularities of stability boundaries and provide with consistent and in-depth description of several most interesting mechanical effects. These include gyroscopic stabilization, instability transfer between the eigenvalue branches, paradox of destabilization by a small damping, disappearance of flutter instability, parametric resonance in periodically excited systems, to name a few.

Authors gave lectures on these topics for years at Moscow State Lomonosov University and Bauman Moscow State Technical University, in Russia; Aalborg University in Denmark; CISM in Italy, and the Institute of Pure and Applied Mathematics in Brazil.

Chapters 1–3 are devoted to the basic theory. Exposition is instructive and sound. Chapter 4 deals with bifurcation analysis of roots and stability of characteristic polynomial dependent on parameters. Chapter 5 discusses the vibrations and stability of conservative systems. Gyroscopic stabilization is dealt with in chapter 6. Chapter 7 exposes linear Hamiltonian systems. Mechanical effects associated with bifurcation and singularities are treated in chapter 8. Chapter 9 is devoted to stability of periodic systems dependent on parameters, while chapter 10 is dedicated to stability boundary of general periodic system. Parametric excitation problems are discussed in chapter 11. Final, 12th chapter is devoted to non-conservative systems under small parametric excitation.

This is an excellent book written by international experts. The book is highly recommended to those who need and/or love stability. Every library of engineering and applied sciences ought to have it.

Isaac Elishakoff