Advanced Tokamak Stability Theory

By Linjin Zheng

Morgan Claypool Publishers, United States, 2015. Paperback. Book Condition: New. 254 x 178 mm. Language: English . Brand New Book. This book describes the advanced stability theories for magnetically confined fusion plasmas, especially in tokamaks. As the fusion plasma sciences advance, the gap between the textbooks and cutting-edge researches gradually develops. This book fills in this gap. It focuses on the advanced topics such as the spectrum of magnetohydrodynamics in tokamaks, the interchange modes, ballooning modes, and toroidal Alfven eigenmodes, etc. in the toroidal geometry. The theories are laid out in parallel with the ideal, resistive magnetohydrodynamics and gyrokinetics formalisms. It details the derivations of the advanced stability theories in this field, such as the ballooning mode representation, the resistive magnetohydrodynamics singular layer theory by A. Glasser, et al. and the gyrokinetic theory. Special efforts are made to explain how the physics problems are formulated mathematically and how to solve them analytically or semi-analytically. Besides the advanced theories, the book also discusses the intuitive physics pictures for various experimentally observed phenomena, such as the confinement modes (L-, I-, and H-modes), the transport barrier, nonlocal transport, edge localized modes, blob transport, and edge harmonic oscillations, etc.

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