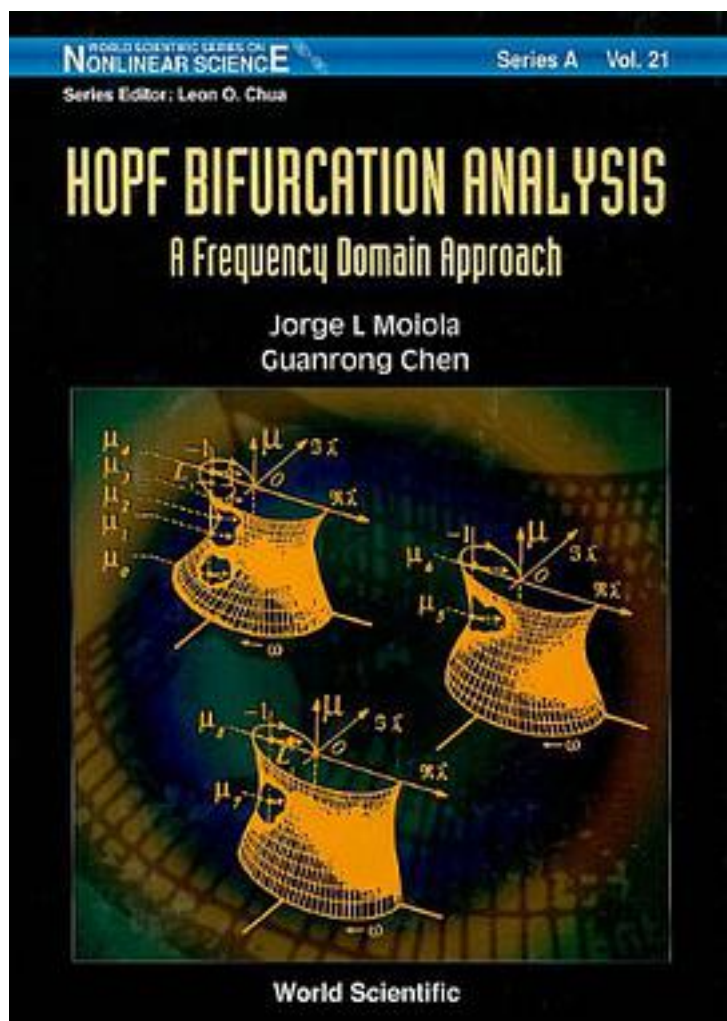


Hopf Bifurcation Analysis



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This book is devoted to the frequency domain approach, for both regular and

degenerate Hopf bifurcation analyses. Besides showing that the time and frequency domain approaches are in fact equivalent, the fact that many significant results and computational formulas obtained in the studies of regular and degenerate Hopf bifurcations from the time domain approach can be translated and reformulated into the corresponding frequency domain setting, and be reconfirmed and rediscovered by using the frequency domain methods, is also explained. The description of how the frequency domain approach can be used to obtain several types of standard bifurcation conditions for general nonlinear dynamical systems is given as well as is demonstrated a very rich pictorial gallery of local bifurcation diagrams for nonlinear systems under simultaneous variations of several system parameters. In conjunction with this graphical analysis of local bifurcation diagrams, the defining and nondegeneracy conditions for several degenerate Hopf bifurcations is presented. With a great deal of algebraic computation, some higher-order harmonic balance approximation formulas are derived, for analyzing the dynamical behaviour in small neighbourhoods of certain types of degenerate Hopf bifurcations that involve multiple limit cycles and multiple limit points of periodic solutions. This book is designed and written in a style of research monographs rather than classroom textbooks, so that the most recent contributions to the field can be included with references.

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