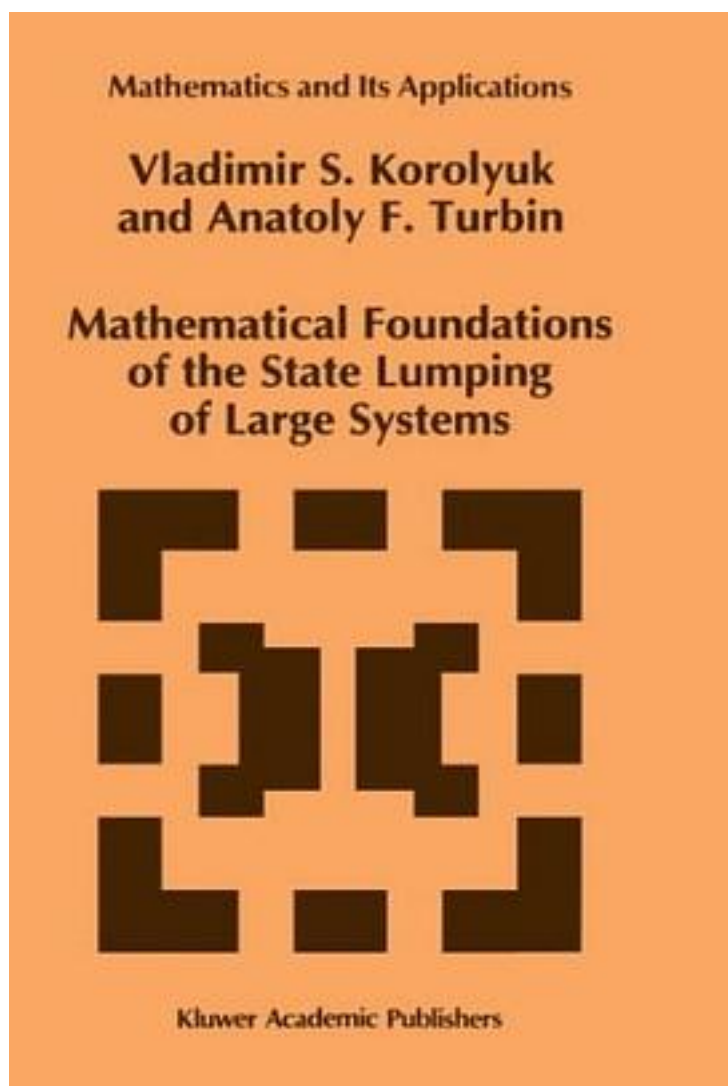


Mathematical Foundations of the State Lumping of Large Systems (Mathematics and Its Applications)



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出版者:Springer

出版时间:1993-08-31

装帧:Hardcover

isbn:9780792324133

This volume is devoted to theoretical results which formalize the concept of state lumping: the transformation of evolutions of systems having a complex (large) phase space to those having a simpler (small) phase space. The theory of phase lumping has aspects in common with averaging methods, projection formalism, stiff systems of differential equations, and other asymptotic theorems. Numerous examples are presented in this book from the theory and applications of random processes, and statistical and quantum mechanics which illustrate the potential capabilities of the theory developed. The volume contains seven chapters. Chapter 1 presents an exposition of the basic notions of the theory of linear operators. Chapter 2 discusses aspects of the theory of semigroups of operators and Markov processes which have relevance to what follows. In Chapters 3--5, invertibly reducible operators perturbed on the spectrum are investigated, and the theory of singularly perturbed semigroups of operators is developed assuming that the perturbation is subordinated to the perturbed operator. The case of arbitrary perturbation is also considered, and the results are presented in the form of limit theorems and asymptotic expansions. Chapters 6 and 7 describe various applications of the method of phase lumping to Markov and semi-Markov processes, dynamical systems, quantum mechanics, etc. The applications discussed are by no means exhaustive and this book points the way to many more fruitful applications in various other areas. For researchers whose work involves functional analysis, semigroup theory, Markov processes and probability theory.

作者介绍:

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