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A large number of physical phenomena are modeled by nonlinear partial differential equations, subject to appropriate initial/ boundary conditions; these equations, in general, do not admit exact solution. The present monograph gives constructive mathematical techniques which bring out large time behavior of solutions of these model equations. These approaches, in conjunction with modern computational methods, help solve physical problems in a satisfactory manner.
The asymptotic methods dealt with here include self-similarity, balancing argument, and matched asymptotic expansions. The physical models discussed in some detail here relate to porous media equation, heat equation with absorption, generalized Fisher's equation, Burgers equation and its generalizations.
A chapter each is devoted to nonlinear diffusion and fluid mechanics. The present book will be found useful by applied mathematicians, physicists, engineers and biologists, and would considerably help understand diverse natural phenomena.