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4.1.4 Numerical Results and Discussions4.2 Thin Film Flow of an Oldroyd 6-Constant Fluid over Moving Belt; 4.2.1 Governing Equations; 4.2.2 Application of OHAM to Thin Film Flow of an Oldroyd 6-Constant Fluid; 4.2.3 Numerical Results and Discussions; 4.3 Falkner-Skan Equation; 4.3.1 The Governing Equation; 4.3.2 Application of OHAM to Falkner-Skan Equation; 4.3.3 Numerical Examples; 4.4 Viscous Flow Due to a Stretching Surface with Partial Slip; 4.4.1 Equation of Motion; 4.4.2 Application of OHAM to Viscous Fluid Given by Eq.4.220; 4.4.3 Numerical Examples
4.5 The Flow and Heat Transfer in a Viscous Fluid Over an Unsteady Stretching Surface4.5.1 Equations of Motion; 4.5.2 Application of OHAM to Flow and Heat Transfer; 4.5.3 Numerical Examples; 4.6 Blasius Problem; 4.6.1 Solution of Blasius Problem by Optimal Homotopy Asymptotic Method; 4.7 Thermal Radiation on MHD Flow over a Stretching Porous Sheet; 4.7.1 Solution of the Problem with Optimal Homotopy Asymptotic Method; 4.7.2 Numerical Examples; 4.8 Nonlinear Equations Arising in Heat Transfer; 4.8.1 Cooling of a Lumped System with Variable Specific Heat; 4.8.1.1 Numerical Examples
4.8.2 The Temperature Distribution Equation in a Thick Rectangular Fin Radiation to Free Space4.8.2.1 Numerical Examples; 4.8.3 A Heat Transfer Problem; 4.8.3.1 Numerical Examples; 4.9 The Nonlinear Age-Structured Population Models; 4.9.1 Analytical Solution for Nonlinear Age-Structured Population Models Using OHAM; 4.10 Volterras Population Model; 4.10.1 Numerical Examples; 4.11 Lotka-Volterra Model with Three Species; 4.11.1 Numerical Examples; 4.12 Bratus Problem; 4.12.1 The Exact Solution of Bratus Problem 4.548; 4.12.2 Solutions of the Bratus Problem by Means of OHAM
4.12.3 Numerical Examples

Sommario/riassunto

This book emphasizes in detail the applicability of the Optimal Homotopy Asymptotic Method to various engineering problems. It is a continuation of the book “Nonlinear Dynamical Systems in Engineering: Some Approximate Approaches”, published at Springer in 2011, and it contains a great amount of practical models from various fields of engineering such as classical and fluid mechanics, thermodynamics, nonlinear oscillations, electrical machines, and so on. The main structure of the book consists of 5 chapters. The first chapter is introductory while the second chapter is devoted to a short history of the development of homotopy methods, including the basic ideas of the Optimal Homotopy Asymptotic Method. The last three chapters, from Chapter 3 to Chapter 5, are introducing three distinct alternatives of the Optimal Homotopy Asymptotic Method with illustrative applications to nonlinear dynamical systems. The third chapter deals with the first alternative of our approach with two iterations. Five applications are presented from fluid mechanics and nonlinear oscillations. The Chapter 4 presents the Optimal Homotopy Asymptotic Method with a single iteration and solving the linear equation on the first approximation. Here are treated 32 models from different fields of engineering such as fluid mechanics, thermodynamics, nonlinear damped and undamped oscillations, electrical machines and even from physics and biology. The last chapter is devoted to the Optimal Homotopy Asymptotic Method with a single iteration but without

solving the equation in the first approximation.