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   Descrizione fisica 1 online resource (476 pages)

   Collana   Physics and Astronomy Series

   Disciplina   003.75

   Soggetti   Soft condensed matter
                       Differential equations
                       Thermodynamics
                       Fluid mechanics
                       Surfaces (Technology)
                       Thin films
                       Fluids
                       Differential Equations
                       Engineering Fluid Dynamics
                       Surfaces, Interfaces and Thin Film

   Lingua di pubblicazione   Inglese

   Formato   Materiale a stampa

   Livello bibliografico   Monografia

   Nota di bibliografia   Includes bibliographical references.

   Nota di contenuto   Introduction -- The Optimal Auxiliary Functions Method -- Dynamics
                       of an Angular Misaligned Multirotor System -- Oscillations of a
                       Pendulum Wrapping on Two Cylinders -- Free Oscillations of Euler-
                       Bernoulli Beams on Nonlinear Winkler-Pasternak Foundation --
                       Nonlinear Vibrations of Doubly Clamped Nanobeam Incorporating the
                       Casimir Force -- Transversal Oscillations of a Beam with Quintic
                       Nonlinearities -- Approximate Analytical Solutions to Jerk Equations --
                       Vibration of Nonlinear Nonlocal Elastic Column with Initial Imperfection
                       -- Nonlinear Vibration of Bernoulli-Euler Beam on a Winkler Elastic
                       Foundation -- The Nonlinear Thermomechanical Vibration of a
                       Functionally Graded Beam(FGB) on Winkler-Pasternak Foundation --
                       Nonlinear Free Vibration of Microtubes -- Nonlinear Free Vibration of
                       Elastically Actuated Microtubes -- Analytical Investigation to Duffing

Harmonic Oscillator -- Free Vibration of Tapered Beams -- Dynamic Analysis of a Rotating Electrical Machine Rotor-bearing System -- Investigation of a Permanent Magnet Synchronous Generator -- Dynamic Response of a Permanent Magnet Synchronous Generator to a Wind Gust -- Axisymmetric Flow and Heat Transfer on a Moving Cylinder -- Blasius Problem -- Numerical Examples -- Thin Film Flow of a Fourth Grade Fluid Down a Vertical Cylinder -- Axisymmetric MHD Flow and Heat Transfer to Modified Second Grade Fluid -- Thin Film Flow of an Eyring Powel Fluid on a Vertical Moving Belt -- The steady Flow of a Fourth Grade Fluid in a Porous Medium -- Thin Film Flow of an Oldroyd Six-constant Fluid Over a Moving Belt -- Cylindrical Liouville-Bratu-Gelfand Problem -- The Polytrophic Spheres of the Nonlinear Lane – Emden – Type Equation Arising in Astrophysics -- The Second Alternative to Optimal Auxiliary Functions Method -- Piecewise Optimal Auxiliary Functions Method -- Some Exact Solutions for Nonlinear Dynamical Systems by Means of the Optimal Auxiliary Functions Method.

| Sommario/riassunto | This book presents the optimal auxiliary functions method and applies it to various engineering problems and in particular in boundary layer problems. The cornerstone of the presented procedure is the concept of "optimal auxiliary functions" which are needed to obtain accurate results in an efficient way. Unlike other known analytic approaches, this procedure provides us with a simple but rigorous way to control and adjust the convergence of the solutions of nonlinear dynamical systems. The optimal auxiliary functions are depending on some convergence-control parameters whose optimal values are rigorously determined from mathematical point of view. The capital strength of our procedure is its fast convergence, since after only one iteration, we obtain very accurate analytical solutions which are very easy to be verified. Moreover, no simplifying hypothesis or assumptions are made. The book contains a large amount of practical models from various fields of engineering such as classical and fluid mechanics, thermodynamics, nonlinear oscillations, electrical machines, and many more. The book is a continuation of our previous books "Nonlinear Dynamical Systems in Engineering. Some Approximate Approaches", Springer-2011 and "The Optimal Homotopy Asymptotic Method. Engineering Applications", Springer-2015. |