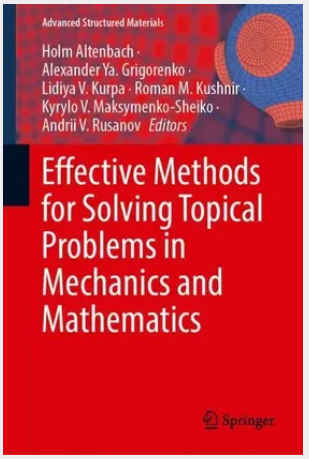
Altenbach / Grigorenko / V. Kurpa

Effective Methods for Solving Topical Problems in Mechanics and Mathematics



This book is dedicated to the outstanding scientist, Academician of the National Academy of Sciences of Ukraine Volodymyr Logvinovich Rvachev, the author of the theory of R-functions, on the occasion of the 100th anniversary of his birth. The book contains contributions by students and followers of V. L. Rvachev, who continued to develop his ideas and apply the R-functions method to the solution of topical problems in mathematics and mechanics, as well as works by researchers who knew V. L. Rvachev personally and were well acquainted with his scientific achievements. The development of the scientific directions initiated by V. L. Rvachev is presented in papers devoted to the mathematical modeling of geometric objects and physical fields, as well as to the further advancement of the theory of atomic functions and non-Archimedean calculus and geometric design problems related to optimizing the arrangement of objects in accordance with a given goal. New applications of the theory of R-functions are demonstrated in the solution of the following problems: bending, vibrations, and stability of sandwich FGM plates and shallow shells; creep problems of plates; viscous fluid flow in bounded domains; flow past axisymmetric bodies; problems of electromagnetic field analysis; and others. In the works of researchers who dedicate their studies to the memory of V. L. Rvachev, methods for investigating the nonlinear dynamics of modern engineering systems are presented. Linear and nonlinear stability problems of FGM rods with variable geometric and mechanical properties are considered, as well as vibration problems of plates and shells with honeycomb cores. The development of asymptotic methods in the theory of composite materials is provided, and problems of steady motion of an electrically conductive crack, the three-dimensional problem of linear elasticity for a layer with a clamped lower surface and a membrane attached to the upper surface, are also examined. Thus, we believe that the problems that will be covered by the articles placed in the book are very relevant. The book can be useful both for researchers who work in the field of development effective numerical analytical methods to investigate static and dynamic behavior of engineering systems, and for graduate students or senior students of technical universities.

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