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Stressed Composite Structures
 Proceedings of the Sixth International Conference on Structural Engineering, Mechanics and Computation, Cape Town, South Africa, 5-7 September 2016
 Structural Integrity and Durability of Advanced Composites
 Handbook of Micromechanics and Nanomechanics
 Innovative Modelling Methods and Intelligent Design
 Higher Gradient Materials and Related Generalized Continua
 Part II. Solution Procedures and Structural Analysis Examples
 Proceedings of the 11th International Conference "Shell Structures: Theory and Applications, (SSTA 2017), October 11-13, 2017, Gdansk, Poland
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DANIKA RODGERS

Springer Nature
 Provides a comprehensive introduction to the dynamic response of lattice materials, covering the fundamental theory and applications in engineering practice Offers comprehensive treatment of dynamics of lattice materials and periodic materials in general, including phononic crystals and elastic metamaterials Provides an in depth introduction to elastostatics and elastodynamics of lattice materials Covers advanced topics such as damping, nonlinearity, instability, impact and

nanoscale systems Introduces contemporary concepts including pentamodes, local resonance and inertial amplification Includes chapters on fast computation and design optimization tools Topics are introduced using simple systems and generalized to more complex structures with a focus on dispersion characteristics
Stressed Composite Structures Academic Press
 This monograph is intended to provide a snapshot of the status and opportunities for advancement in the technologies of dynamics and control of large flexible spacecraft structures. It is a reflection of the serious dialog and assessments

going on all over the world, across a wide variety of scientific and technical disciplines, as we contemplate the next major milestone in mankind's romance with space: the transition from exploration and experimentation to commercial and defense exploitation. This exploitation is already in full swing in the space communications area. Both military and civilian objectives are being pursued with increasingly more sophisticated systems such as large antenna reflectors with active shape control. Both the NATO and Warsaw pact alliances are pursuing permanent space stations in orbit: large structural systems whose development calls for in-situ fabrication and/or assembly

and whose operation will demand innovations in controls technology. The last ten years have witnessed a fairly brisk research activity in the dynamics and control of large space structures in order to establish a technology base for the development of advanced spacecraft systems envisioned for the future. They have spanned a wide spectrum of activity from fundamental methods development to systems concept studies and laboratory experimentation and demonstrations. Some flight experiments have also been conducted for various purposes such as the characterization of the space environment, durability of materials and devices in that environment, assembly and repair operations, and the dynamic behavior of flexible structures. It is this last area that has prompted this monogram.

Proceedings of the Sixth International Conference on Structural Engineering, Mechanics and Computation, Cape Town, South Africa, 5-7 September 2016 CRC Press

Shells are basic structural elements of modern technology and everyday life. Examples are automobile bodies, water and oil tanks, pipelines, aircraft fuselages, nanotubes, graphene sheets or beer cans. Also nature is full of living shells such as leaves of trees, blooming flowers, seashells, cell membranes, the double helix of DNA or wings of insects. In the human body arteries, the shell of the eye, the diaphragm, the skin or the pericardium are all shells as well. *Shell Structures: Theory and Applications, Volume 3* contains 137 contributions presented at the 10th Conference "Shell Structures: Theory and Applications" held October 16-18, 2013 in Gdansk, Poland. The papers cover a wide spectrum of scientific and engineering problems which are divided into seven broad groups: general lectures, theoretical modelling, stability, dynamics, bioshells, numerical analyses, and engineering design. The volume will be of interest to researchers and designers dealing with modelling and analyses of shell structures and thin-walled structural elements.

Structural Integrity and Durability of Advanced Composites Asymptotic Analysis for Periodic Structures

It was mainly during the last two decades that the theory of homogenization or averaging of partial differential equations took shape as a distinct mathematical discipline. This theory has a lot of important applications in mechanics of composite and perforated materials, filtration, disperse media, and in many other branches of physics, mechanics and

modern technology. There is a vast literature on the subject. The term averaging has been usually associated with the methods of non linear mechanics and ordinary differential equations developed in the works of Poincare, Van Der Pol, Krylov, Bogoliubov, etc. For a long time, after the works of Maxwell and Rayleigh, homogenization problems for partial differential equations were being mostly considered by specialists in physics and mechanics, and were staying beyond the scope of mathematicians. A great deal of attention was given to the so called disperse media, which, in the simplest case, are two-phase media formed by the main homogeneous material containing small foreign particles (grains, inclusions). Such two-phase bodies, whose size is considerably larger than that of each separate inclusion, have been discovered to possess stable physical properties (such as heat transfer, electric conductivity, etc.) which differ from those of the constituent phases. For this reason, the word homogenized, or effective, is used in relation to these characteristics. An enormous number of results, approximation formulas, and estimates have been obtained in connection with such problems as electromagnetic wave scattering on small particles, effective heat transfer in two-phase media, etc. *Handbook of Micromechanics and Nanomechanics* Springer Nature

The focus of this is on the latest developments related to the analysis of problems in which several scales are presented. After a theoretical presentation of the theory of homogenization in the periodic case, the other contributions address a wide range of applications in the fields of elasticity (asymptotic behavior of nonlinear elastic thin structures, modeling of junction of a periodic family of rods with a plate) and fluid mechanics (stationary Navier-Stokes equations in porous media). Other applications concern the modeling of new composites (electromagnetic and piezoelectric materials) and imperfect transmission problems. A detailed approach of numerical finite element methods is also investigated.

Innovative Modelling Methods and Intelligent Design CRC Press

This book presents a *liber amicorum* dedicated to Wolfgang H. Müller, and highlights recent advances in Prof. Müller's major fields of research: continuum mechanics, generalized mechanics, thermodynamics, mechanochemistry, and geomechanics. Over 50 of Prof. Müller's friends and colleagues contributed to this book, which commemorates his 60th birthday and was published in recognition

of his outstanding contributions.

Higher Gradient Materials and Related Generalized Continua World Scientific

Insights and Innovations in Structural Engineering, Mechanics and Computation comprises 360 papers that were presented at the Sixth International Conference on Structural Engineering, Mechanics and Computation (SEMC 2016, Cape Town, South Africa, 5-7 September 2016). The papers reflect the broad scope of the SEMC conferences, and cover a wide range of engineering structures (buildings, bridges, towers, roofs, foundations, offshore structures, tunnels, dams, vessels, vehicles and machinery) and engineering materials (steel, aluminium, concrete, masonry, timber, glass, polymers, composites, laminates, smart materials). Some contributions present the latest insights and new understanding on (i) the mechanics of structures and systems (dynamics, vibration, seismic response, instability, buckling, soil-structure interaction), and (ii) the mechanics of materials and fluids (elasticity, plasticity, fluid-structure interaction, flow through porous media, biomechanics, fracture, fatigue, bond, creep, shrinkage). Other contributions report on (iii) recent advances in computational modelling and testing (numerical simulations, finite-element modeling, experimental testing), and (iv) developments and innovations in structural engineering (planning, analysis, design, construction, assembly, maintenance, repair and retrofitting of structures). Insights and Innovations in Structural Engineering, Mechanics and Computation is particularly of interest to civil, structural, mechanical, marine and aerospace engineers. Researchers, developers, practitioners and academics in these disciplines will find the content useful. Short versions of the papers, intended to be concise but self-contained summaries of the full papers, are collected in the book, while the full versions of the papers are on the accompanying CD. Part II. Solution Procedures and Structural Analysis Examples Springer Science & Business Media

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Proceedings of the 11th International Conference "Shell Structures: Theory and Applications, (SSTA 2017), October 11-13, 2017, Gdansk, Poland John Wiley & Sons

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In Memory of Jacques-Louis Lions World Scientific

This book provides an introduction to the

theory and numerical developments of the homogenization method. Its main features are: a comprehensive presentation of homogenization theory; an introduction to the theory of two-phase composite materials; a detailed treatment of structural optimization by using homogenization; a complete discussion of the resulting numerical algorithms with many documented test problems. It will be of interest to researchers, engineers, and advanced graduate students in applied mathematics, mechanical engineering, and structural optimization.

The Finite Element Method for Solid and Structural Mechanics CRC Press

This is a reprinting of a book originally published in 1978. At that time it was the first book on the subject of homogenization, which is the asymptotic analysis of partial differential equations with rapidly oscillating coefficients, and as such it sets the stage for what problems to consider and what methods to use, including probabilistic methods. At the time the book was written the use of asymptotic expansions with multiple scales was new, especially their use as a theoretical tool, combined with energy methods and the construction of test functions for analysis with weak convergence methods. Before this book, multiple scale methods were primarily used for non-linear oscillation problems in the applied mathematics community, not for analyzing spatial oscillations as in homogenization. In the current printing a number of minor corrections have been made, and the bibliography was significantly expanded to include some of the most important recent references. This book gives systematic introduction of multiple scale methods for partial differential equations, including their original use for rigorous mathematical analysis in elliptic, parabolic, and hyperbolic problems, and with the use of probabilistic methods when appropriate. The book continues to be interesting and useful to readers of different backgrounds, both from pure and applied mathematics, because of its informal style of introducing the multiple scale methodology and the detailed proofs.

Shell Structures: Theory and Applications (Vol. 2) Springer Science & Business Media

This second part of the work on creep modeling offers readers essential guidance on practical computational simulation and analysis. Drawing on constitutive equations for creep in structural materials under multi-axial stress states, it applies these equations, which are developed in detail in part 1 of the work, to a diverse

range of examples.

Shell Structures: Theory and Applications Springer Nature

Boundary element methods relate to a wide range of engineering applications, including fluid flow, fracture analysis, geomechanics, elasticity, and heat transfer. Thus, new results in the field hold great importance not only to researchers in mathematics, but to applied mathematicians, physicists, and engineers. A two-day minisymposium Mathematical Aspects of Boundary Element Methods at the IABEM conference in May 1998 brought together top rate researchers from around the world, including Vladimir Maz'ya, to whom the conference was dedicated. Focusing on the mathematical and numerical analysis of boundary integral operators, this volume presents 25 papers contributed to the symposium. Mathematical Aspects of Boundary Element Methods provides up-to-date research results from the point of view of both mathematics and engineering. The authors detail new results, such as on nonsmooth boundaries, and new methods, including domain decomposition and parallelization, preconditioned iterative techniques, multipole expansions, higher order boundary elements, and approximate approximations. Together they illustrate the connections between the modeling of applied problems, the derivation and analysis of corresponding boundary integral equations, and their efficient numerical solutions.

Encyclopedia of Optical and Photonic Engineering (Print) - Five Volume Set Springer

The Institute for Mathematical Sciences at the National University of Singapore hosted a two-month research program on "Mathematical Theory and Numerical Methods for Computational Materials Simulation and Design" from 1 July to 31 August 2009. As an important part of the program, tutorials and special lectures were given by leading experts in the fields for participating graduate students and junior researchers. This invaluable volume collects four expanded lecture notes with self-contained tutorials. They cover a number of aspects on multiscale modeling, analysis and simulations for problems arising from materials science including some critical components in computational prediction of materials properties such as the multiscale properties of complex materials, properties of defects, interfaces and material microstructures under different conditions, critical issues in developing efficient numerical methods and analytic frameworks for complex and

multiscale materials models. This volume serves to inspire graduate students and researchers who choose to embark into original research work in these fields.

Modeling High Temperature Materials Behavior for Structural Analysis

Springer Science & Business Media

Addressing algebraic problems found in biomathematics and energy, *Free and Moving Boundaries: Analysis, Simulation and Control* discusses moving boundary and boundary control in systems described by partial differential equations (PDEs). With contributions from international experts, the book emphasizes numerical and theoretical control of moving boundaries in fluid structure couple systems, arteries, shape stabilization level methods, family of moving geometries, and boundary control. Using numerical analysis, the contributors examine the problems of optimal control theory applied to PDEs arising from continuum mechanics. The book presents several applications to electromagnetic devices, flow, control, computing, images analysis, topological changes, and free boundaries. It specifically focuses on the topics of boundary variation and control, dynamical control of geometry, optimization, free boundary problems, stabilization of structures, controlling fluid-structure devices, electromagnetism 3D, and inverse problems arising in areas such as biomathematics. *Free and Moving Boundaries: Analysis, Simulation and Control* explains why the boundary control of physical systems can be viewed as a moving boundary control, empowering the future research of select algebraic areas.

Critical Review and New Applications SIAM

Advances in Mechanics: Theoretical, Computational and Interdisciplinary Issues covers the domain of theoretical, experimental and computational mechanics as well as interdisciplinary issues, such as industrial applications. Special attention is paid to the theoretical background and practical applications of computational mechanics. This volume *Homogenization of Differential Operators and Integral Functionals* CRC Press The book is devoted to rigorous derivation of macroscopic mathematical models as a homogenization of exact mathematical models at the microscopic level. The idea is quite natural: one first must describe the joint motion of the elastic skeleton and the fluid in pores at the microscopic level by means of classical continuum mechanics, and then use homogenization to find appropriate approximation models (homogenized equations). The Navier-Stokes equations still hold at this scale of

the pore size in the order of 5 - 15 microns. Thus, as we have mentioned above, the macroscopic mathematical models obtained are still within the limits of physical applicability. These mathematical models describe different physical processes of liquid filtration and acoustics in poroelastic media, such as isothermal or non-isothermal filtration, hydraulic shock, isothermal or non-isothermal acoustics, diffusion-convection, filtration and acoustics in composite media or in porous fractured reservoirs. Our research is based upon the Nguetseng two-scale convergent method.

A Tribute to Wolfgang H. Müller CRC Press Shell Structures. Theory and Applications, Volume 2 contains 77 contributions from over 17 countries, reflecting a wide spectrum of scientific and engineering problems of shell structures. The papers are divided into six broad groups: 1. General lectures; 2. Theoretical modeling; 3. Stability; 4. Dynamics; 5. Numerical analysis; 6. Engineering design, and will be of interest to academics, researchers, designers and engineers dealing with theoretical modelling, computerized analyses and engineering design of thin-

walled structures and shell structural elements.

Computation and Applied Mathematics American Mathematical Soc.

This book is devoted to researchers and teachers, as well as graduate students, undergraduates and bachelors in engineering mechanics, nano-mechanics, nanomaterials, nanostructures and applied mathematics. It presents a collection of the latest developments in the field of nonlinear (chaotic) dynamics of mass distributed-parameter nanomechanical structures, providing a rigorous and comprehensive study of modeling nonlinear phenomena. It is written in a unique pedagogical style particularly suitable for independent study and self-education. In addition, the book achieves a good balance between Western and Eastern extensive studies of the mathematical problems of nonlinear vibrations of structural members.

Modelling, Analysis and Asymptotics - Lectures given at the C.I.M.E. Summer School held in Cetraro, Italy, September 11-16, 2006 Springer Science & Business Media

Computational Analysis of Structured Media presents a systematic approach to analytical formulae for the effective properties of deterministic and random composites. Schwarz's method and functional equations yield for use in symbolic-numeric computations relevant to the effective properties. The work is primarily concerned with constructive topics of boundary value problems, complex analysis, and their applications to composites. Symbolic-numerical computations are widely used to deduce new formulae interesting for applied mathematicians and engineers. The main line of presentation is the investigation of two-phase 2D composites with non-overlapping inclusions randomly embedded in matrices. Computational methodology for main classes of problems in structured media Theory of Representative Volume Element Combines exact results, Monte-Carlo simulations and Resummation techniques under one umbrella Contains new analytical formulae obtained in the last ten years and it combines different asymptotic methods with the corresponding computer implementations

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