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Finite-volume direct averaging micromechanics of heterogeneous materials with elastic-plastic phases ... The finite-element approach applied to the analysis of heterogeneous materials has gained popularity in recent years due to the relative ease with which modern commercial codes can be used through convenient graphical interfaces. Standard ...

Finite-volume direct averaging micromechanics of ...

Work is currently under way to cast this higher-order finite-volume theory within the homogenization framework based on quadrilateral subvolume unit cell discretization. 7. Closing remarks. The parametric FVDAM theory is a particular finite-volume based technique developed for the solution of unit cell problems of heterogeneous materials.

Finite-volume micromechanics of periodic materials: Past

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Finite-volume direct averaging micromechanics (FVDAM) is a promising tool that can accurately predict both the homogenized and localized responses of two/three dimensional (2D/3D) heterogeneous...

Finite-volume direct averaging micromechanics of ...

[Show full abstract] problem to the analysis of periodic heterogeneous media can be solved by the well-established 0th order version of the finite-volume theory, named finite-volume direct ...

(PDF) Generalized finite-volume micromechanics theory for ...

The unit cell problem to the analysis of periodic heterogeneous materials is explored in this book, with emphasis on the generalized finite-volume direct averaging micromechanics

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Homogenization Of Heterogeneous Media

Generalized Finite-Volume Micromechanics Theory ...

The finite-volume direct averaging micromechanics (FVDAM) theory for periodic heterogeneous materials is extended by incorporating parametric mapping into the theory's analytical framework. The parametric mapping enables modeling of heterogeneous microstructures using quadrilateral subvolume discretization, in contrast with the standard version based on rectangular subdomains.

Parametric Finite-Volume Micromechanics of Uniaxial ...

Recent Developments in the Micromechanics of Heterogeneous Media: Finite-Volume and Locally-Exact Homogenization Theories
Marek-Jerzy Pindera University of Virginia Collaborators: Mr. Hamed Khatam (University of Virginia) Dr. Yogesh Bansal (Boeing Company) Dr. Anthony Drago (Sikorsky Aircraft Corp) Dr.

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Linfeng Chen (GMS, LLP, New York)

Recent Developments in the Micromechanics of Heterogeneous ...

This book provides the main theoretical and numerical tools to solve homogenization problems in solids with finite elements. It allows students without any preliminary knowledge on homogenization to acquire the basics and to implement the methodologies in simple programs such as Matlab.

Computational Homogenization of Heterogeneous Materials ...

Because most heterogeneous materials show a statistical rather than a deterministic arrangement of the constituents, the methods of micromechanics are typically based on the concept of the representative volume element (RVE). An RVE is understood to be a sub-volume of an inhomogeneous medium

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Micromechanics - Wikipedia

In this paper, we extend the finite volume direct average micromechanics to enable the use of quadrilateral subcells. To do this work, the quadrilateral subcells are used to discretize the repeating unit cells first. Then the average displacement and traction defined on the boundary of the subcell are evaluated by direct integral method.

Quadrilateral Subcell Based Finite Volume Micromechanics ...

Micromechanics of Heterogeneous Materials features rigorous theoretical methods of applied mathematics and statistical physics in materials science of microheterogeneous media. The prediction of the behavior of heterogeneous materials by the use

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of properties of constituents and their microstructures is a central issue of micromechanics.

Micromechanics of Heterogeneous Materials | Valeriy ...

Abstract Based on the recently discovered mechanics of structure genome, a micromechanics theory is developed for computing the effective properties and local fields of aperiodic heterogeneous materials. This theory starts with expressing the displacements of the heterogeneous material in terms of those of the corresponding homogeneous material and fluctuating functions.

A micromechanics theory for homogenization and ...

T1 - A statistical descriptor based volume-integral micromechanics model of heterogeneous material with arbitrary inclusion shape. AU - Liu, Zeliang. AU - Moore, John A. AU - Aldousari, Saad M. AU - Hedia, Hassan S. AU - Asiri, Saeed A. AU -

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Liu, Wing K. PY - 2015/5/25. Y1 - 2015/5/25

A statistical descriptor based volume-integral ...

S. Nemat-Nasser and M. Hori, 1993, Micromechanics: Overall Properties of Heterogeneous Materials ... Nonlinear Finite Elements for Continua and Structures. John Wiley and Sons, Ltd., New York, 2000. J. Bonet and R. D. Wood. Nonlinear ... On constitutive macro-variables for heterogeneous solids at finite strain. Proc. Royal Soc. Lond. A ...

Micromechanics of composites - Wikiversity

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doi:10.1016/j.ijplas.2005.04.012 Bansal, Y. and Pindera, M-J.

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Bansal, Y. and Pindera, M-J., "Finite-Volume Direct Averaging Micromechanics of Heterogeneous Materials with Elastic-Plastic Phases," Int. J. Plasticity, Vol. 22, No. 5, 2006, pp. 775-825. On the Micromechanics-Based Simulation of Metal Matrix Composite Response

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Finite-Volume Direct Averaging Micromechanics of Heterogeneous Materials with Elastic-Plastic Phases, Int. J. Plasticity, Vol. 22, No. 5, pp. 775-825. 2. Pindera, M-J. and Bansal, Y., 2007. On the Micromechanics-Based Simulation of Metal Matrix Composite Response, ASME J. Engineering Materials & Technology, Vol. 129, No. 3, pp. 468-482.

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