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Nota di contenuto	Cellular and Porous Materials Thermal Properties Simulation and Prediction; Contents; Preface; List of Contributors; 1 Interfacial Heat Transport in Highly Permeable Media: A Finite Volume Approach; 1.1 Introduction; 1.2 Governing Equations; 1.2.1 Microscopic Transport Equations; 1.2.2 Decomposition of Flow Variables in Space and Time; 1.2.3 Macroscopic Flow and Energy Equations; 1.2.4 Macroscopic Two-Energy Equation Modeling; 1.2.5 Interfacial Heat Transfer Coefficient; 1.3 Numerical Determination of hi; 1.3.1 Physical Model; 1.3.2 Periodic Flow; 1.3.3 Film Coefficient hi 1.4 Results and Discussion1.4.1 Array of Square Rods; 1.4.2 Array of Elliptic Rods; 1.4.3 Correlations for Laminar and Turbulent Flows; 1.5 Conclusions; References; 2 Effective Thermal Properties of Hollow-Sphere Structures: A Finite Element Approach; 2.1 Introduction; 2.1.1 Finite Element Method and Heat Transfer Problems; 2.1.2 Hollow-Sphere Structures in the Context of Cellular Metals; 2.2 Finite Element

Method; 2.2.1 Basics of Heat Transfer; 2.2.2 Weighted Residual Method; 2.2.3 Discretization and Principal Finite Element Equation; 2.2.4 Four-Node Planar Bilinear Quadrilateral (Quad4)
2.2.4.1 General Rectangular Quad4 Element2.2.4.2 Postprocessing; 2.2.5 Nonlinearities; 2.3 Modelling of Hollow-Sphere Structures; 2.3.1 Geometry, Mesh and Boundary Conditions; 2.3.2 Material Properties; 2.4 Determination of the Effective Thermal Conductivities; 2.4.1 Influence of the Morphology and Joining Technique; 2.4.2 Influence of the Topology; 2.4.3 Temperature-Dependent Material Properties; 2.4.3.1 Low Temperature Gradient; 2.4.3.2 High Temperature Gradient; 2.4.4 Application Example: Sandwich Structure; 2.5 Conclusions; References
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5.2 Mathematical Models for Heat Conduction

Sommario/riassunto

Providing the reader with a solid understanding of the fundamentals as well as an awareness of recent advances in properties and applications of cellular and porous materials, this handbook and ready reference covers all important analytical and numerical methods for characterizing and predicting thermal properties. In so doing it directly addresses the special characteristics of foam-like and hole-riddled materials, combining theoretical and experimental aspects for characterization purposes.