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Nota di contenuto	Challenges and Advances in Image-Based Geometric Modeling and Mesh Generation, by Yongjie Zhang -- 3D Surface Realignment Tracking for Medical Imaging: A Phantom Study with PET Motion Correction , by Oline V. Olesen, Rasmus R. Paulsen, Rasmus R. Jensen, Sune H. Keller, Merence Sibomana, Liselotte Højgaard, Bjarne Roed, and Rasmus Larsen -- Flexible Multi-scale Image Alignment Using B-Spline Reparametrization, by Yanmei Zheng, Zhucui Jing, Guoliang Xu -- Shape based Conditional Random Fields for Segmenting Intracranial Aneurysms, by Sajjad Baloch, Erkang Cheng, and Tong Fang -- Tetrahedral Image-To-Mesh Conversion Approaches For Surgery Simulation and Navigation, by Andrey N. Chernikov, Panagiotis A. Foteinos, Yixun Liu, Michel Audette, Andinet Enquobahrie, and Nikos P. Chrisochoides -- Surface Triangular Mesh and Volume Tetrahedral Mesh Generations for Biomolecular Modelling, by Minxin Chen, Bin Tu and Benzhuo Lu -- A Combined Level Set/Mesh Warping Algorithm for Tracking Brain and Cerebrospinal Fluid Evolution in Hydrocephalic Patients, by Jeonghyung Park, Suzanne M. Shontz, and Corina S. Drapaca -- An Optimization-Based Iterative Approach to Tetrahedral Mesh Smoothing , by Zhanheng Gao, Zeyun Yu, and Jun Wang -- High-Quality Multi-Tissue Mesh Generation for Finite Element Analysis, by

Panagiotis A. Foteinos and Nikos P. Chrisochoides -- Construction of Models and Meshes of Heterogeneous Material Microstructures from Image Data, by Ottmar Klaas, Mark W. Beall, and Mark S. Shephard -- Quality Improvement of Segmented Hexahedral Meshes Using Geometric Flows, by Juelin Leng, Guoliang Xu, Yongjie Zhang, and Jin Qian -- Patient-Specific Model Generation and Simulation for Pre-Operative Surgical Guidance for Pulmonary Embolism Treatment, by Shankar P. Sastry, Jibum Kim, Suzanne M. Shontz, Brent A. Craven, Frank C. Lynch, Keefe B. Manning, and Thap Panitanarak -- Computational Techniques for Analysis of Shape and Kinematics of Biological Structures, by Jia Wu and John C. Brigham -- Finite Element Modeling of Biomolecular Systems in Ionic Solution, by Benzhuo Lu.

Sommario/riassunto

As a new interdisciplinary research area, “image-based geometric modeling and mesh generation” integrates image processing, geometric modeling and mesh generation with finite element method (FEM) to solve problems in computational biomedicine, materials sciences and engineering. It is well known that FEM is currently well-developed and efficient, but mesh generation for complex geometries (e.g., the human body) still takes about 80% of the total analysis time and is the major obstacle to reduce the total computation time. It is mainly because none of the traditional approaches is sufficient to effectively construct finite element meshes for arbitrarily complicated domains, and generally a great deal of manual interaction is involved in mesh generation. This contributed volume, the first for such an interdisciplinary topic, collects the latest research by experts in this area. These papers cover a broad range of topics, including medical imaging, image alignment and segmentation, image-to-mesh conversion, quality improvement, mesh warping, heterogeneous materials, biomodelcular modeling and simulation, as well as medical and engineering applications. This contributed volume, the first for such an interdisciplinary topic, collects the latest research by experts in this area. These papers cover a broad range of topics, including medical imaging, image alignment and segmentation, image-to-mesh conversion, quality improvement, mesh warping, heterogeneous materials, biomodelcular modeling and simulation, as well as medical and engineering applications.