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EDITORIAL

Editorial

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This special issue contains 7 papers carefully selected by reviewers from the workshop 3D Physiological Human held in Zermatt, Switzerland, in December 2008. These papers have been extended for this special issue. This 3D physiological workshop has been very successful grouping together several experts in the medical 3D field. The first paper deals with real-time guidewire simulation in complex vascular models proposed by Vincent Luboz, Rafal Blazewski, Derek Gould and Fernando Bello from Imperial College in London. This paper extends their previous framework with more realistic instrument behavior and more complex vascular models. The instrument is modeled as a hybrid mass-spring model of particles connected by rigid springs of equal length, while the vasculature is a triangulated surface mesh segmented from patient data sets. The second paper is by Nicolas Pronost, Xavier Maurice, Anders Sandholm, Ronan Boulic and Daniel Thalmann from EPFL in Switzerland. The paper deals in a subject-specific software solution for the modeling and visualization of muscles deformation. In this paper, the authors propose a numerical solution, based on the Finite Element (FE) method, allowing to estimate muscle deformations during contraction. The next paper is on anatomically based musculoskeletal modeling: prediction and validation of muscle deformation during walking. The authors are Katja Oberhofer, Kumar Mithraratne, Ngaire S. Stott and Iain A. Anderson from the University of Auckland. In this paper, they outline and validate a free-form deformation method called the Host Mesh Fitting (HMF) technique for predicting the muscle deformation during walking, of a subject-specific musculoskeletal model. Bernhard Kainz, Ursula Reiter, Gert Reiter and Dieter Schmalstieg from the Graz University of Technology propose an in vivo interactive visualization of four-dimensional blood flow patterns. In this paper, the authors give an overview over a series of experiments to visualize and measure flow fields in the human vascular system with respect to their diagnostic capabilities. Statistical shape analysis of 3D scanned human heads provides important information for many applications. Pengcheng Xi and Chang Shu of the National Research Council of Canada present consistent parameterization and statistical analysis of human head scans. The next paper is by Caecilia Charbonnier, Lazhari Assassi, Pascal Volino and Nadia Magnenat-Thalmann, all from MIRALab—University of Geneva. It discusses a motion study of the hip joint in extreme postures, where the aim is to analyze the consequences of repetitive extreme hip motion on the labrum cartilage. In the last paper, Enrico Gobbetti, Marco Agus, Fabio Bettio, Andrea Giachetti, Jose Antonio Iglesias Guitian, Fabio Marton, Jonas Nilsson and Giovanni Pintore from the Center for Advanced Studies, Research and Development in Sardinia (CRS4), present an interactive 3D medical visualization system based on a light field display. A prototype medical data visualization system is described and discussed, exploiting a light field display and custom direct volume rendering techniques to enhance the understanding of massive volumetric data, such as CT, MRI, and PET scans.

Guest Editors

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