Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Parallel Adaptive Computation of Blood Flow in a 3D "Whole" Body Model M. ZHOU, Rensselaer Polytechnic Institute, C.A. FIGUEROA, C.A. TAYLOR, Stanford University, O. SAHNI, K.E. JANSEN, Rensselaer Polytechnic Institute — Accurate numerical simulations of vascular trauma require the consideration of a larger portion of the vasculature than previously considered, due to the systemic nature of the human body's response. A patient-specific 3D model composed of 78 connected arterial branches extending from the neck to the lower legs is constructed to effectively represent the entire body. Recently developed outflow boundary conditions that appropriately represent the downstream vasculature bed which is not included in the 3D computational domain are applied at 78 outlets. In this work, the pulsatile blood flow simulations are started on a fairly uniform, unstructured mesh that is subsequently adapted using a solution-based approach to efficiently resolve the flow features. The adapted mesh contains non-uniform, anisotropic elements resulting in resolution that conforms with the physical length scales present in the problem. The effects of the mesh resolution on the flow field are studied, specifically on relevant quantities of pressure, velocity and wall shear stress.

M. Zhou
Rensselaer Polytechnic Institute

Date submitted: 04 Aug 2008 Electronic form version 1.4