1048-92-367 **Damir B. Khismatullin*** (damir@tulane.edu), Department of Biomedical Engineering, Tulane University, 500 Lindy Boggs Center, New Orleans, LA 70118. *Application of the viscoelastic Volume-of-Fluid algorithm to biological systems.*

Biological systems are characterized by a significant level of heterogeneity and, on the macro-scale, behave as viscoelastic materials. To study the mechanical behavior of biological systems, we have developed a novel parallel algorithm for fully three-dimensional numerical simulation of multiphase viscoelastic flow. The algorithm consists of the second order Volume-of-Fluid method for tracking fluid-fluid interfaces, the projection method for solving the Navier-Stokes equations, and the semi-implicit factorized scheme for the constitutive equation for the stress tensor (Giesekus, Oldroyd-B, or Upper-Convected Maxwell fluid). We will talk about the application of the algorithm to the problems in microvascular hemodynamics, such as leukocyte-endothelial cell adhesion and blood flow in channels with complex geometry. We will show that the code we developed can accurately predict leukocyte rolling on vascular endothelium and blood flow in sprouting vessels. Proposals for extending the algorithm to other biological problems will also be discussed. (Received February 10, 2009)