Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

A Spatial-Temporal Model of Platelet Deposition and Blood Coagulation Under Flow KARIN LEIDERMAN GREGG, AARON FOGELSON, University of Utah — In the event of a vascular injury, a blood clot will form to prevent bleeding. This response involves two intertwined processes: platelet aggregation and coagulation. Activated platelets are critical to coagulation in that they provide localized reactive surfaces on which many of the coagulation reactions occur. The final product from the coagulation cascade directly couples the coagulation system to platelet aggregation by acting as a strong activator of platelets and cleaving blood-borne fibrinogen into fibrin which then forms a mesh to help stabilize platelet aggregates. Together, the fibrin mesh and the platelet aggregates comprise a blood clot, which in some cases, can grow to occlusive diameters. Transport of coagulation proteins to and from the vicinity of the injury is controlled largely by the dynamics of the blood flow. It is crucial to learn how blood flow affects the growth of clots, and how the growing masses, in turn, feed back and affect the fluid motion. We have developed the first spatial-temporal model of platelet deposition and blood coagulation under flow that includes detailed decriptions of the coagulation biochemistry, chemical activation and deposition of blood platelets, as well as the two-way interaction between the fluid dynamics and the growing platelet mass.

Karin Leiderman Gregg
University of Utah

Date submitted: 12 Aug 2009 Electronic form version 1.4