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Computational Investigations on Flow-mediated Transport Processes at the Blood-thrombus Interface[1] DEBANJAN MUKHERJEE, University of Colorado Boulder — Pathological clotting of blood, referred to as thrombosis, is the primary cause of diseases like stroke and heart-attack which are associated with significant morbidity and mortality. Thrombus (blood clot) formation, and its behavior, is governed by multiple underlying physiological processes which are intimately related to flow and transport. Of specific importance is the role of transport processes near the blood-thrombus interface, and permeation of biochemical species (drug or coagulation factors) into the thrombus. Here we present the latest developments in our investigations into creating a computational multi-physics modeling framework for thrombus biomechanics and bio-transport. Our framework is based on a combination of Galerkin stabilized finite element method, and Lagrangian particle based approach. We have employed our framework to conduct a range of computational experiments to illustrate flow mediated near thrombus transport using thrombus models reconstructed from microscopy image data. We will present results from our computational investigations into: (a) the role of blood-thrombus interface properties on transport; (b) biochemical species permeation across the thrombus interface; and (c) subsequent influence on intra-thrombus transport.

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Debanjan Mukherjee
University of Colorado Boulder

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