1139-76-597 **Lucia Carichino*** (lcarichino@wpi.edu), **Giovanna Guidoboni** and **Marcela Szopos**.

Coupling PDEs and ODEs for blood flow simulations.

Multiscale coupling of nonlinear distributed and lumped fluid flow models are often necessary when modeling complex biological vascular systems. When interested in studying in details a specific segment of the vasculature, usually, to reduce simulations costs, a distributed partial differential equations (PDEs) model is used to simulate the segment of interest, while the rest of the vasculature is approximated using a lumped ordinary differential equations (ODEs) model. We develop a novel technique based on operator splitting for the time discretization of coupled systems of Stokes equations and ODEs that: (i) allows nonlinearities to be solved in separate steps; (ii) ensures overall stability of the numerical scheme; (iii) gives flexibility in choosing the numerical method and discretization approach of each sub-step. The main novelty of this splitting approach is that it ensures that the energy of the semi-discrete problem mirrors the behavior of the energy of the fully coupled problem, providing unconditional stability. Moreover, the block structure of the proposed splitting scheme allows the scheme to be easily modified to be first or second-order in time, to account for different fluid rheologies, and to consider rigid or deformable domains. (Received February 20, 2018)