1155-92-328 **Jae Ho Lee*** (jaeholee@live.unc.edu), **Robert Hunt** (huntrl@live.unc.edu), **Margaret Anne Smith** (masmath@live.unc.edu) and **Boyce E. Griffith** (boyceg@email.unc.edu).

Fluid-Structure Interaction Models of Bioprosthetic Heart Valves to Study Leaflet Dynamics.

The incidence of valvular heart disease increases rapidly with age, and the only treatment for severe valvular disease remains repair or replacement. Pulse duplicator systems are widely used in academia and industry and by regulators to design and assess prosthetic heart valves. This study leverages a fluid-structure interaction model of bioprosthetic valve dynamics in a ViVitro pulse duplicator system to study the role of valve geometry and leaflet flexibility on the leaflet dynamics. Our model is based on a version of the immersed boundary method that allows for the use of general hyperelastic material models for the immersed structures. Using this simulation framework, we present direct comparisons between model predictions and bulk flow properties (flow rates, pressure differences) and measurements of leaflet dynamics (valve area) obtained from the experimental pulse duplicator system as well as initial work towards comparing flow profiles to experimental flow profiles obtained using particle image velocimetry (PIV) in the ViVitro pulse duplicator. We study the role of leaflet geometry and elasticity on the dynamics of the device that may be relevant to leaflet durability. Our results suggest that a fully coupled FSI approach is needed to capture the full leaflet dynamics. (Received January 18, 2020)