1056-65-1713   **Edward W. Swim*** (`edward.swim@usma.edu`), Department of Mathematical Sciences, United States Military Academy, 646 Swift Rd., West Point, NY 10996-1905. *Delaunay refinement methods for FSI systems undergoing changes in topological properties.* Preliminary report.

A key component of modeling the interaction between flexible structures that either surround a region of fluid (as with blood flow through arteries) or are immersed within an ambient fluid (such as flexible wing structures for micro air vehicles and canopies used for parachutes) is the simulation of the behavior of the system whenever structural components are in intermittent contact or very close to a contact configuration. In such situations, the topological properties of the computational fluid domain change. Thus, a modification of the assumptions within the dynamic fluid model is required.

In order to mimic the opening and closing of thin elastic structures during such a simulation, the mesh movement scheme must preserve the physical nature of the flexible structure and accurately represent the changing boundaries between the fluid and solid subdomains. In this work we discuss a method for protecting these boundaries at each step of a fluid-structure interaction simulation through the use of a ball covering strategy that translates to a weighted Delauney triangulation. Our procedure builds upon the DelPSC algorithm of Dey and Levine by extending their work with piecewise smooth complexes to include moving boundaries. (Received September 22, 2009)