1115-92-355 **Wenzhao Sun**, **Zhiliang Xu**, **Pavel Brodskiy**, **Ali Nematbakhsh**, **Cody Narciso**, **Jeremiah J. Zartman** and **Mark S. Alber*** (malber@nd.edu), Department of Appl. & Comp. Math. and Stat., University of Notre Dame, Notre Dame, IN 46556. *Multi-scale model of epithelial cells proliferation and mechanics.*

Epithelia are sheets of tightly adherent, asymmetrically organized cells that provide a protective barrier for organs. The close association of epithelial cells through physical interactions and active adhesion leads to tightly packed cellular networks. Several mathematical and computational models have been developed to simulate the dynamics of cell growth, division and neighboring cell-cell interactions and shape changes, which drive tissue morphogenesis. However, cells are typically approximated as polygons to simplify computation effort, resulting in poor descriptions of many morphogenetic processes including mitotic rounding. We will describe in this talk newly developed cell-based subcellular elements (SCE) computational model implemented on high performance Graphical Processing Units (GPUs) cluster. The model represents mechanical properties of both the internal cytoplasm and outer membrane of each cell with subcellular nodes connected by springs and potentials. The model does not require ad hoc rules to simulate cell neighbor changes. Model simulations match cell and tissue properties including the overall distributions of cell neighbor numbers during the cell cycle for a model epithelium, the Drosophila wing disc. (Received September 22, 2015)