1065-92-130 **Laura A Miller*** (lam9@email.unc.edu), Department of Mathematics, CB 3250 Phillips Hall, Chapel Hill, NC 27599, and **Christina Hamlet** (chamlet@email.unc.edu) and **Arvind Santhanakrishnan**. *Viscous flow through arrays of cylinders with applications to biological protective layers and filtering.*

Arrays of extracellular proteins and cellular protrusions can act as both vasculoprotective layers and mechanosensors. For example, blood flow profiles through the endothelial surface layer determine the amount of shear stress felt by the endothelial cells and may alter the rates at which molecules enter and exit the cells. Characterizing the flow profiles through such layers is therefore critical towards understanding the function of such arrays in cell signaling and molecular filtering. Since in vivo and in vitro measurements of flow near and within these layers are difficult to obtain, previous work has focused on mathematical models that treat the layers as homogeneous porous layers. The limitations of such models for irregular regions of the layers as well as for particle transport are not clear. In this presentation, dynamically scaled physical models were used to study the flow profiles through arrays of cylinders. The results were then compared to numerical simulations using the Method of Regularized Stokeslets. The volume fraction, height, and length of the physical and mathematical models were varied. The results were then used to understand how variations in density and height of such structures alter shear stresses and bulk flows. (Received September 09, 2010)