Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

The size, shape, and dynamics of cellular blebs KENG-HWEE CHIAM, FONG YIN LIM, A*STAR Institute of High Performance Computing, L. MAHADEVAN, Harvard University — Blebs are protrusions of cell membrane driven by intracellular pressure that are commonly seen in many types of cells. Recent studies on cell blebbing have revealed them to be an important mechanism contributing to cell motility. We have developed a quantitative biomechanical model to study how a bleb develops when a portion of the cell membrane detaches from the underlying cortex. From the model, we calculate the minimum cytoplasmic pressure and minimum unsupported membrane length for a bleb to nucleate and grow. We also show how a bleb may travel around the periphery of the cell. The traveling speed is governed by the speed of the pressure changes induced by variations in the cortical contractility. On the other hand, the asymmetry of the shape of the bleb is governed by the healing of actin cortex at the rear end of the bleb.

Keng-Hwee Chiam
A*STAR Institute of High Performance Computing

Date submitted: 15 Nov 2009 Electronic form version 1.4