Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Formation of a cylindrical bridge in cell division DANIEL CITRON, LAURA E. SCHMIDT, University of Chicago, ELIZABETH REICHL, YIXIN REN, DOUGLAS ROBINSON, Johns Hopkins University, WENDY W. ZHANG, University of Chicago — In nature, the shape transition associated with the division of a mother cell into two daughter cells proceeds via a variety of routes. In the cylinder-thinning route, which has been observed in *Dictyostelium* and most animal cells, the mother cell first forms a broad bridge-like region, also known as a furrow, between two daughter cells. The furrow then rapidly evolves into a cylindrical bridge, which thins and eventually severs the mother cell into two. The fundamental mechanism underlying this division route is not understood. Recent experiments on *Dictyostelium* found that, while the cylinder-thinning route persists even when key actin cross-linking proteins are missing, it is disrupted by the removal of force-generating myosin-II proteins. Other measurements revealed that mutant cells lacking myosin-II have a much more uniform tension over the cell surface than wild-type cells. This suggests that tension variation may be important. Here we use a fluid model, previously shown to reproduce the thinning dynamics [Zhang & Robinson, PNAS **102**, 7186 (2005)], to test this idea. Consistent with the experiments, the model shows that the cylinder formation process occurs regardless of the exact viscoelastic properties of the cell. In contrast to the experiments, a tension variation in the model hinders, rather then expedites, the cylinder formation.

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Date submitted: 06 Aug 2007 Electronic form version 1.4