Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Disordered Actomyosin Is Sufficient to Promote Cooperative and Telescopic Contractility[1] MICHAEL MURRELL, IAN LINSMEIER, Yale University, SHILADITYA BANERJEE, University College London, TAE YOON KIM, WONYEONG JUNG, Purdue University, PATRICK OAKES, University of Rochester — While the molecular interactions between myosin motors and F-actin are well known, the relationship between F-actin organization and myosin-mediated force generation remains poorly understood. Here, we explore the accumulation of myosin-induced stresses within a 2D biomimetic model of the actomyosin cortex, where myosin activity is controlled spatially and temporally using light. By controlling the geometry and the duration of myosin activation, we show that contraction of disordered actomyosin is highly cooperative, telescopic with the activation area and generates a pattern of mechanical stresses consistent with those observed in contractile cells. We quantitatively reproduce these properties using an in vitro isotropic model of the actomyosin cytoskeleton, and explore the physical origins of telescopic contractility in disordered networks using agent-based simulations.

[1]NSF CMMI-1525316

Michael Murrell
Yale Univ

Date submitted: 06 Nov 2016 Electronic form version 1.4