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Cellular Polarization and Contractility in Collective Cell Migration[1] KAZAGE J CHRISTOPHE UTUJE, Syracuse University, JACOB NOTBOHM, University of Wisconsin-Madison, SHILADITYA BANERJEE, University of Chicago, BOMI GWEON, Hanyang University, HWANSEOK JANG, YONGDOO PARK, Korea University, JENNIFER SHIN, KAIST, JAMES P. BUTLER, JEFFREY J. FREDBERG, Harvard T.H. Chan School of Public Health, M. CRISTINA MARCHETTI, Syracuse University — Collective cell migration drives many biological processes such as metastasis, morphogenesis and wound healing. These coordinated motions are driven by active forces. The physical nature of these forces and the mechanisms by which they generate collective cell migration are still not fully understood. We have developed a minimum physical model of a cell monolayer as an elastic continuum whose deformation field is coupled to two internal degrees of freedom: the concentration of a chemical signal, controlling cell contractility, and the polarization field controlling the direction of local cell motion. By combining theory with experiments, we show that these two internal variables account for the sloshing waves and the systematic deviations of the direction of cell polarization from that of local cell velocity observed in confined cell monolayers.

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