Abstract Submitted
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In-plane video force microscopy of morphogenesis in epithelia[1] M. SHANE HUTSON, DAVID MASHBURN, Vanderbilt University, ERIC COPENHAVER, University of Akron, W. TYLER MCCLEERY, Vanderbilt University, JIM VELDHUIS, STEVEN KIM, G. WAYNE BRODLAND, University of Waterloo — Video force microscopy (VFM) is a technique that takes segmented time-lapse images as input and makes least-squares estimates for the cell-edge tensions and cell-internal pressures needed to drive observed changes in cell shape. VFM has previously been used to estimate the cell-level forces that drive invagination during Drosophila gastrulation. Doing so required time-lapse images containing entire cross-sections of the embryo. Here, we extend video force microscopy to in-plane images of epithelia – including examples in which the images cover only a small region of a larger epithelium. This extension requires imposition of constraints on the average cell-internal pressure and the average stress external to the observed patch. We will demonstrate successful estimation of forces in exact models, as well as anomalous cases that prevent successful force estimation. We will then show applications of this technique for inferring the forces driving Drosophila germband retraction and wound healing.

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