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Elastohydrodynamics of contact in adherent sheets ANDREAS CARLSON, Harvard University, SHREYAS MANDRE, Brown University, L. MAHADEVAN, Harvard University — The dynamics of contact between a thin elastic film and a solid arises in many scientific and engineering applications, from the simple saran-wrap to cellular adhesion to grounding lines in ice sheets. Here, we use a mathematical description of the multi-scale processes associated with microscopic adhesion, fluid flow and elastic thin film deformation to deduce the dynamics of the onset of adhesion, as well as the speed and the shape of the adhesion zone. Our analysis is consistent with prior experimental observations, provides new testable predictions for the shape, size and dynamics of adherent contact in thin sheets and in addition provides a broadly applicable prescription for the boundary conditions at elastic contact lines.

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