Geophysical Research Abstracts
Vol. 15, EGU2013-3274, 2013
EGU General Assembly 2013

Elasto-hydrodynamic adhesion

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We are interested in the hydrodynamically mediated adhesion of a flexible membrane against a flat rigid substrate. A very primitive adhesion mechanism is encountered when trying to disjoin two parallel flat surfaces separated by a fluid layer. Drainage of the neighbouring fluid into the opening gap induces viscous resistance to traction. In the case of two stiff surfaces, this force was calculated more than a century ago by Stefan and Reynolds. We will present experimental and numerical results showing how elastic deformations of one of the membranes can greatly enhance this hydrodynamic adhesion.