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The role of deformable structured surfaces on viscous forces during peeling[1] CHARLES DHONG, JOELLE FRECHETTE, Johns Hopkins University — It is known that tree frogs are able to adhere well in flooded environments, presumably due to their interconnected network of drainage channels formed by hexagonal epithelial cells in their toe pads. To investigate this effect, a patterned surface of hexagonally arranged cylindrical posts was brought close to a stationary substrate in a submerged, viscous fluid via a normal load, and then peeled off to measure a retraction force. Because these structured surfaces were made from PDMS, they are able to deform throughout the process. We find that these deformable surfaces further reduce the work required to peel apart the two surfaces, even when compared to previous studies in the same system with rigid structures, and we isolated these contributions independent of conservative forces. We then conducted experiments to compare the effect of deformation on the viscous forces and conservative forces. We find that there are several regimes where deformation either increases or decreases the retraction force since we have found that elasticity decreases retraction forces when considering viscous contributions but is also known to increase adhesion in the context of conservative forces.

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