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A model of droplet durotaxis driven by the elastocapillary response of a soft viscoelastic substrate[1] SAIFUL TAMIM, JOSHUA BOSTWICK, Clemson University — Dynamic wetting of soft solids has many industrial and biological applications which require a rigorous understanding of the underlying fluid transport mechanism. One such phenomena, known as durotaxis, involves the spontaneous motion of liquid drops on a soft substrate with a thickness gradient. A passive driving force is generated by the elastocapillary deformation of the compliant substrate due to the interaction with the drop. We model the interactions of a two-dimensional drop with a neutrally-wetting viscoelastic substrate with thickness gradient. The substrate response is characterized by a sharp triangular wetting ridge at the contact line whose geometry changes the macroscopic contact angle of the liquid drop from its equilibrium value. The gradient in substrate thickness causes the contact angle to be less on the thicker side, which generates a driving force that moves the drop in the direction of increasing thickness. The drop velocity is determined by the viscoelastic relaxation of the substrate (viscoelastic braking), and computed from a self-consistent model that relates the soft wetting force to the viscoelastic dissipation. We find our results to be in close agreement to the velocities observed in experiment by Style et al. 2013, *PNAS*.

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