Impact of the Equation of State in Models for Surfactant Spreading Experiments[1] RACHEL LEVY, Harvey Mudd College — Pulmonary surfactant spreading models often rely on an equation of state relating surfactant concentration to surface tension. Mathematically, these models have been analyzed with simple functional relationships. However, to model an experiment with a given fluid and surfactant, a physically meaningful equation of state can be derived from experimentally obtained isotherms. We discuss the comparison between model and experiment for NBD-PC lipid (surfactant) spreading on glycerol for an empirically-determined equation of state, and compare those results to simulations with traditionally employed functional forms. In particular we compare the timescales by tracking the leading edge of surfactant, the central fluid height and dynamics of the Marangoni ridge. We consider both outward spreading of a disk-shaped region of surfactant and the hole-closure problem in which a disk-shaped surfactant-free region self-heals.

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