Surfactant on a Thin Liquid Layer: Outward Spreading[1] ELLEN SWANSON, Centre College, STEPHEN STRICKLAND, MICHAEL SHEARER, KAREN DANIELS, North Carolina State University — The spreading of insoluble surfactant molecules on a thin liquid layer can be modeled by a coupled system of two fourth order partial differential equations. The equations for the surfactant concentration and the height of the liquid layer are derived from the Stokes equations using the lubrication approximation, and have been accepted as an accurate prediction of the spreading behavior for over two decades. In experiments, we measure the surfactant concentration profile through fluorescence imaging of tagged lipids, while simultaneously measuring the height profile with laser profilometry. We compare the outward spreading observed in the experiment to that predicted by the numerical simulations of the model, and find inconsistencies for initial surfactant distributions both above and below the critical monolayer concentration. Similar inconsistencies are also found when the surfactant is spreading inward; these are described in the companion talk that follows.

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