

Abstract Submitted
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A Model Problem for Tear Film Distribution on a Moving Rectangular Domain QUAN DENG, TOBIN DRISCOLL, RICHARD BRAUN, University of Delaware — We consider a model problem for the pre-corneal tear film on a moving 2D rectangular domain. The problem considers a thin Newtonian layer covered by an insoluble surfactant representing the effect of polar lipids. A nonlinear PDE for film thickness from the lubrication approximation, together with a nonlinear PDE for the surfactant concentration is solved using the method of lines with spectral methods in space. The Marangoni effect couples the variables together. Numerical experiments using different end motions (realistic or sinusoidal) and perturbations to the surfactant distributions (to imitate observe lipid distributions *in vivo*) were performed. The results indicate that some *in vivo* elements of the tear film distribution with relatively long length scales are captured by the model, but some fine-scale phenomena are not captured. If time permits, results from a two layer model will be presented.

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