

Abstract Submitted  
for the DFD05 Meeting of  
The American Physical Society

**One Dimensional Models for Bubble Bursts on a Tear Film Surface** M.C. SOSTARECZ, R.J. BRAUN, L.P. COOK, University of Delaware — Recent observations of the human tear film surface show bright spots that appear to be bubbles which are present as the eyelid opens. These bubbles move upward on the tear film surface in what is generally accepted to be a concentration gradient. Typically, the bubbles burst and disperse in a process that is strongly suggestive of surfactant spreading in a background flow. Using lubrication theory, we present one-dimensional models both with and without mean surface tension, together with the Marangoni effect for an insoluble surfactant. Solutions are computed numerically using an implementation of the method of lines with finite difference discretizations in space. The models explore the multiple time scales that appear to be present in the tear film relatively rapid surfactant spreading is followed by slow relaxation driven by surface tension.

Michael Sostarecz  
University of Delaware

Date submitted: 29 Jul 2005

Electronic form version 1.4