Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Dynamics of particle settling and resuspension in viscous liquid films[1] ANDREA BERTOZZI, Department of Mathematics, University of California Los Angeles, NEBOJSA MURISIC, Princeton University, BENOIT PAUSADER, Courant Institute of Mathematical Sciences, New York University, DIRK PESCHKA, Weierstrass-Institute for Applied Analysis and Stochastics, Berlin — We develop a dynamic model for suspensions of negatively buoyant particles on an incline. Our model includes settling due to gravity as well as resuspension of particles by shear-induced migration. We consider the case where the particles settle onto the solid substrate and two distinct fronts form, namely a faster liquid and a slower particle front. We show that the resulting transport equations for the liquid and the particles are of hyperbolic type, and study the dilute limit, for which we compute exact solutions. We also carry out systematic laboratory experiments, focusing on the motion of the liquid and the particle fronts. We show that the dynamic model predictions for small to moderate values of the particle volume fraction and the inclination angle of the solid substrate agree well with the experimental data.

[1]This work was supported by NSF grant DMS-1048840 and UC Lab Fees 976 Research Grant 09-LR-04-116741-BERA.

Andrea Bertozzi
Department of Mathematics, University of California Los Angeles

Date submitted: 09 Aug 2012 Electronic form version 1.4