

### **376b Influence of Physical and Chemical Heterogeneity Shape on Thin Film Rupture**

*Anuj Chauhan and David Simmons*

It is known that the breakup times for thin liquid films on solid surfaces can be substantially smaller if the surface is heterogeneous, either chemically or physically. Here we explore issues related to the effect of the shape of the physical and chemical heterogeneities on the breakup time and the thinning behavior. We consider two shapes, sinusoidal and exponential, for both physical and chemical gradients and compare the breakup times for these two different forms of gradients. Furthermore, the wavelength of the sinusoidal gradients and the length scale of the exponential gradients are varied and the effects of these on the breakup times and the film evolution are determined. For the sinusoidal gradients, we also obtain analytical results for shape evolution that are valid at short times and for small amplitude perturbation of the physical/chemical heterogeneities. The fastest growing modes are determined for spinodal breakup and also for both shapes (sinusoidal and exponential) of physical and chemical heterogeneities. The breakup times for the fastest growing modes from the linear and the nonlinear studies are compared for spinodal breakup and these results are also compared with those for both chemical and physical heterogeneities, of both sinusoidal and exponential shapes.