# Dewetting in non-isothermic ultra-thin two-layer liquid films



A.A. Nepomnyashchy, I.B. Simanovskii
Department of Mathematics and Minerva Center
for Nonlinear Physics of Complex Systems,
Technion- Israel Institute of Technology,
Haifa 32000 Israel

We investigate the influence of the thermocapillary effect on the dewetting process caused by van der Waals forces in a non-isothermic two-layer liquid film. Both the linear stability analysis and numerical simulations are carried out.

In the case of a lateral heating, the development of an instability leads to the decomposition of the film into droplets driven by thermocapillary stresses. Depending on the parameters, the motion of droplets is accompanied by their fast anisotropic coalescence, appearance of "tadpole"-shaped droplets creating secondary droplets of smaller size, or formation of rivulets oriented along the direction of the thermocapillary force.

In the case when the primary temperature gradient is directed across the film, the Marangoni effect influences the characteristic time scale of the film decomposition and the characteristic size of the droplets formed. On a cooled substrate, the dewetting caused by the van der Waals forces can be completely suppressed. The Marangoni effect can lead to nontrivial change of the droplets shapes, e.g. the formation of "inkpot"-like droplets and even more exotic shapes of droplets. Also, the Marangoni effect can generate an oscillatory instability which creates disordered waves on the film interfaces.