

# Bifurcation from stability to instability in free boundary problems

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## **Abstract**

I shall describe two models of free boundary problems which arise in physics and biology. The first one is concerned with a classical problem of an electrostatically charged viscous droplet, and the second one is about tumor growth. In each of these problems, there is a critical parameter, the surface tension coefficient  $\gamma$  of the free boundary. For the large values of  $\gamma$ , the free boundary which is initially nearly spherical will converge to a sphere as time goes to  $\infty$ . But when  $\gamma$  crosses a critical number, instability develops. The critical value is typically a Liapunov-Schmidt bifurcation point, but not always so; it may instead be a Hopf bifurcation.