Krogerup Lectures

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1. Similarity solutions and all that
Similarity solutions are a fundamental tool to describe singular behavior in in fluid dynamics and other continuum theories. I will use a simple model equation (describing fluid pinch-off), which is solvable analytically, to illustrate the method. We will learn about various types of scaling, universality, and stability of solutions.

2. Slow convergence - bubble breakup In this lecture I will describe recent work on the pinch-off of an air bubble released under water [1,2]. In this case the scaling of the neck size as function of time is well described by a power law, but the exponent differs from the value derived taking the asymptotic limit. Instead, the dynamics are dominated by transient effects, which can be described by a simple dynamical system.

[1] J. Eggers, M.A. Fontelos, D. Leppinen, J.H. Snoeijer, "Theory of the collapsing axisymmetric cavity", Phys. Rev. Lett. 98 , 094502 (2007)

[2] M. A. Fontelos, J. Snoeijer, J. Eggers, "The spatial structure of bubble pinch-off", SIAM J. Appl. Math. 71 , 1696 (2011)