Institut für Angewandte Mathematik

Oberseminar
Analysis und Theoretische Physik

Prof. Dr. Thomas Hagen
(University of Memphis)

Surface Tension-Induced Dynamics of Networked Droplets

Motivated by the defense mechanism of a leaf beetle (*Hemisphaerota cyanea*), we present and analyze a dynamical system modeling surface tension-induced flows of liquids in networks of interconnected channels. These channel flows are driven by volume scavenging where fluid droplets of varying sizes leech off one another to increase in volume. Volume exchange arises by pressure (curvature) differences that drive liquid from one to another droplet along the network of channels.

The underlying physics-based model is given by a large gradient system of ordinary differential equations on a simple, connected graph. It generalizes an earlier Newtonian model by van Lengerich, Vogel and Steen. The presentation will report about previously unknown equilibrium solutions, a (surprisingly) complete, rigorous classification of their stability in dependence on the relevant bifurcation parameters as well as related results on forward invariant sets and hierarchies of equilibria. The stability discussion is complicated by the (potential) non-hyperbolicity of the equilibria. The nonlinear dynamics will be demonstrated with some animations. "The infinite-droplet limit" will be obtained via Sobolev regularization for certain networks. This is joint work with Paul H. Steen (Cornell).

Dienstag, 14. Mai 2019, 15:00 Uhr, Raum c311
Hauptgebäude der Universität

Über Ihren Besuch würden sich freuen:
    Prof. Dr. Wolfram Bauer
    Prof. Dr. Joachim Escher
    Prof. Dr. Elmar Schrohe
    Prof. Dr. Christoph Walker