

# Instabilities and Pattern Formation in Mechanically Vibrating Thin Films

Michael Bestehorn

Chair of Statistical Physics and Nonlinear Dynamics

Brandenburg University of Technology, Cottbus – Senftenberg, Germany

In a liquid layer with a free surface several hydrodynamic instabilities may occur and may lead to self-organized pattern formation. The patterns can be seen as macroscopic motion of the fluid, surface deformations, temperature or concentration distributions etc.

In this contribution, the Faraday instability for thin films is studied in detail. The liquid layer is thereby vibrated with one or more frequencies in normal and tangential direction(s) with respect to its surface. For a partially wetting substrate (small contact angle) a reduced theoretical description based on the lubrication approximation is possible [1, 2]. Linear stability as well as nonlinear results will be presented and compared to findings of the full set of hydrodynamic basic equations. Recent results of a two-layer system consisting of two immiscible fluids separated by a deformable interface will be discussed [3, 4].

## References

- [1] M. Bestehorn, Q. Han, A. Oron, *Nonlinear pattern formation in thin liquid films under external vibrations*, Phys. Rev. E 88, 023025 (2013)
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