1 Themen Masterseminar Wintersemester 2018-19 (Uwe Thiele[1])

1. Aggregation-fragmentation and individual dynamics of active clusters

Aggregation-fragmentation and individual dynamics of active clusters

Literatur: [1, 2, 3]

An interesting feature of active particles is their self-organisation into clusters. The talk introduces the concept of active particles, describes their collective behaviour and introduces basic modelling approaches (equations of motion, master equations, field theory).

2. Discrete self-similarity in the hydrodynamics of thin films

Diskrete Selbstähnlichkeit in der Hydrodynamik dünner Filme
Literatur: [4, 5, 6, 7]

Self-similarity is an important concept across many disciplines. The talk introduces the concept using the rupture of thin liquid films as example, derives equations for the self-similar solution and extends the concept towards discrete self-similarity.

3. Continuum and discrete approaches in modeling biofilm

Kontinuum- und diskrete Modelle für Biofilme
Literatur: [8] and references therein

Biofilms are colonies of bacteria that may show various collective modes of growth. The talk introduces biofilms in general and gives an overview of main concepts behind discrete and continuous dynamical models. Further, typical results of the different model types are presented and limitations of the models are discussed.

4. From the real to the complex Swift-Hohenberg equation

Von der reellen zur komplexen Swift-Hohenberg Gleichung

Literatur: [9, Chap. 9.4 of],[10, 11]

The real Swift-Hohenberg (SH) equation is a classic model equation of pattern formation. Since it corresponds to a gradient dynamic it cannot describe time-periodic or uniformly moving states. The talk first introduces the SH equation and related basic concepts before presenting the complex form. Qualitatively new solution behaviour of the complex SH equation is analyzed and discussed.

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References

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