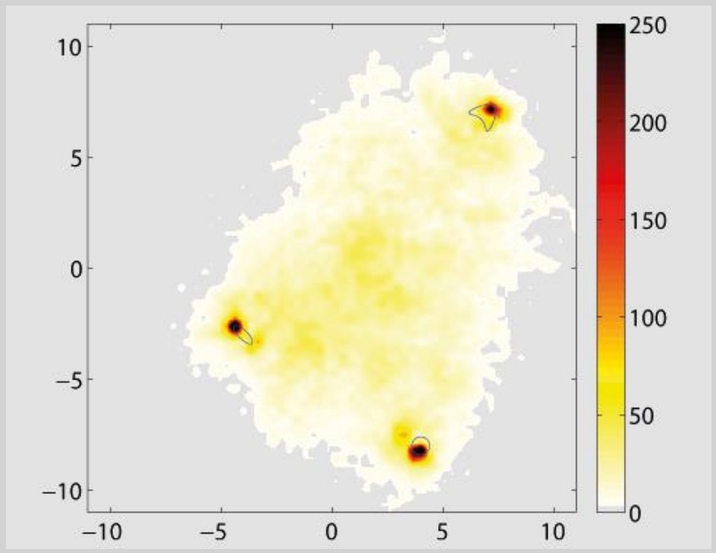

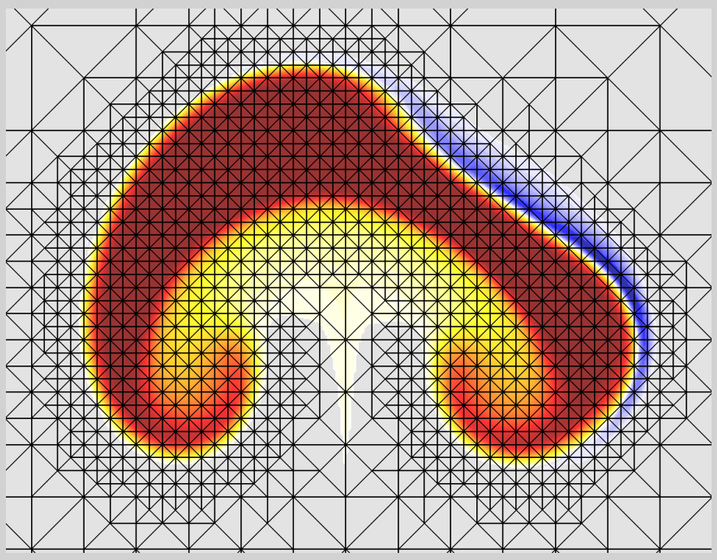

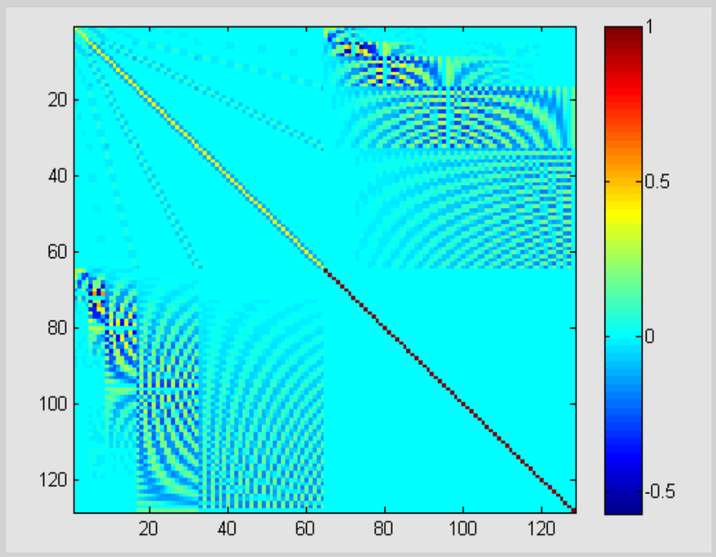

Oberseminar Numerik

Herr Giordano Tierra PhD (Karlsuniversität Prag)

13.10.15
10:00 Uhr
Hilbertraum (05-432)
Staudingerweg 9, 55128 Mainz

„Numerical methods for solving the Cahn-Hilliard equation and its applicability to mixtures of isotropic and nematic flows with anchoring effects“

Abstract:
The study of interfacial dynamics between two different components has become the key role to understand the behavior of many interesting systems, with applications in science, engineering, and industry. The Cahn-Hilliard model was originally introduced by Cahn and Hilliard to describe the complicated phase separation and coarsening phenomena in the mixture of different fluids, solid or gas where only two different concentration phases can exist stably.
In the first part of the seminar, I will present different numerical schemes to approximate the Cahn-Hilliard model, showing the advantage and disadvantages of each scheme. In particular, I will focus on the study of the constraints on the physical and discrete parameters that can appear to assure the energy-stability, unique solvability and, in the case of nonlinear schemes, the convergence of Newton's method to the nonlinear schemes. Moreover, an adaptive time stepping algorithm will be presented and the behavior of the schemes will be compared through several computational experiments.
In the second part of the seminar, I will focus on a diffuse interface approach to represent mixtures composed by isotropic fluids and nematic liquid crystals. I will present new linear unconditionally energy-stable splitting schemes that take into account viscous, mixing, nematic and anchoring effects. This formulation allows us to split the computation of the three pairs of unknowns (velocity-pressure, phase field-chemical potential and director vector-equilibrium) in three different steps. Finally, I will present several numerical simulations to illustrate the correct behavior of the proposed numerical schemes and to show the dependence of the dynamics on the different types of anchoring effects that can be considered.
This contribution is based on joint work with Francisco Guillen-Gonzalez (Universidad de Sevilla, Spain) and Mara Angeles Rodrguez-Bellido (Universidad de Sevilla, Spain).

Hierzu sind alle herzlich eingeladen.

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