Beitrag ID: **18** Typ: **Talk**

A High-Order Method for the Interaction of Fluids and Soft Substrates with Three-Phase Contact Lines

Dienstag, 6. Dezember 2022 14:00 (30 Minuten)

We present a highly accurate extended discontinuous Galerkin method (XDG) for the simulation of multiphase problems involving three-phase contact lines on a flexible solid. We will show results of a simulation of a water droplet sitting on a silicone-gel, utilizing Navier slip boundary conditions on the interface and Young's equation at the three-phase contact line. Characteristically, singularities are observed at interfaces and three-phase contact lines between distinct phases, e.g. a jump in pressure or surface tensions. This is problematic for high order methods, where generally smooth functions are required to obtain a high order of convergence.

We will briefly outline the basic concepts of the XDG method and then concentrate on its central component: interfaces and contact lines [1]. In the XDG method, interfaces are defined implicitly by the zero isocontours of a group of level sets. Each level set describes the interface between two phases, three-phase contact lines are situated at the intersection of two level sets. To elaborate, we will outline algorithms involved in evolving and regularizing the interfaces and we will detail the numerical coupling approach at fluid-fluid and fluid-solid interfaces by means of examples.

REFERENCES:
[1] Kummer, F., 2017. Extended discontinuous Galerkin methods for two-phase flows: the spatial discretization. Int. J. Numer. Meth. Engng, 109: 259–289.
[2] Wang, Y. and Oberlack, M. A thermodynamic model of multiphase flows with moving interfaces and contact line. Continuum Mechanics and Thermodynamics (2011) 23, Article Number: 409.

Hauptautoren: KUMMER, Florian (TU Darmstadt - FG Strömungsdynamik); BECK, Lauritz (TU Darmstadt - FG Strömungsdynamik)

Vortragende(r): KUMMER, Florian (TU Darmstadt - FG Strömungsdynamik)

Sitzung Einordnung: Short Talks