Beitrag ID: **23** Typ: **Talk**

High-Order Methods for Fluid-Soft Substrate Interactions with Heat Transfer and Evaporation

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We introduce an advanced extended discontinuous Galerkin method (XDG) tailored for the simulation of multiphase problems including three-phase contact lines. This approach adeptly handles three-phase contact lines, especially evident when examining the interaction between water droplets and flexible solids such as silicone-gel. Utilizing the Navier slip boundary conditions coupled with Young's equation, we probe the intricacies of these interactions. An intrinsic challenge arises from the singularities observed at interfaces and three-phase contact lines, such as abrupt changes in pressure or surface tensions. High-order methods typically require smooth functions to achieve optimal convergence, which poses a challenge in these situations.
Within the first phase of the priority programme, a Euler-Lagrange approach was realized. For the second phase, where also Heat Transfer and Evaporation should be considered, we are transitioning to a Euler-Euler model. The representation of all properties within the same Euler frame allows a fully coupled solution, which benefits the numerical stability of the method.
We are going to present a deep and comprehensive comparison between the Euler-Lagrange and Euler-Euler models. Our analysis will not only present numerical results but also address the methodological underpinnings that prompted our transition from one model to the other. Furthermore, we are going to show first results on evaporation, with special emphasis on the modelling at the contact line.

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Sitzung Einordnung: Short Talks