

Moment method for rod-like polymers

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Abstract : There are two methods to derive hydrodynamic equations from kinetic equations when the Knudsen number tends to zero: the Hilbert method and the moment method. While the former only requires mild properties on the linearized collision operator, the latter requires specific conservation relations to hold. For classical models, the two methods are equivalent (at least formally), as the required properties of the linearized collision operator can be related to conservations. However, there are cases where conservation relations are lacking and only (so far) the Hilbert method is applicable. In this talk, I will focus on one of these examples, the kinetic model of rod-like polymers, or Doi model. I will show that suitable generalized conservation relations (aka generalized collision invariants) hold and make the moment method applicable in spite of the lack of conservation relations in the strict sense. It could lead to a better understanding of the structural properties of the Doi model and open the way to rigorous convergence proofs that would require less regularity than the Hilbert method.