

MODELLING, NUMERICS AND ANALYSIS OF FIBER SUSPENSION FLOWS¹

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The rich variety of dynamics observed in fiber suspension flows emerges from the complex interplay among the fibers and the fluid phase subjected to external forces and poses considerable challenge to the modeller. In this talk, we focus on the flow of a suspension that admits hydrodynamical description, the fiber volume fraction ranging from dilute to concentrated regimes. Both flows in the bulk of the material and in the vicinity of a flat solid wall are considered.

A host of new models concerning the fiber suspension rheology has been proposed in the recent years, see e.g. [1; 2]. We review some current trends in the modelling and present a novel model for the orientation dynamics of fibers near a solid wall.

Significant advances have been made in computational rheology enabling direct numerical simulations of PDEs in configuration spaces of high dimension using the Proper Generalized Decomposition method, see [3]. This approach circumvents the closure problem and hence is of great interest for simulation of fiber suspension flows.

We consider the mesoscale rheological system of PDEs in a formulation that includes most of the considered models and establish certain well-posedness results.

REFERENCES

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