

A diffuse interface model of Fluid-Structure Interactions for blood flows and thrombus

Yadong Liu

School of Mathematical Sciences, Nanjing Normal University, Nanjing 210023,

P. R. China.

ydliu@njnu.edu.cn

Abstract

This talk concerns a diffuse interface model for the flow of two incompressible viscoelastic fluids in a bounded domain. More specifically, the fluids are assumed to be macroscopically immiscible, but with a small transition region, where the two components are partially mixed. Considering the elasticity of both components, one ends up with a coupled Oldroyd-B/Cahn-Hilliard type system, which describes the behavior of two-phase viscoelastic fluids. In particular, the model describes the interaction between thrombus and blood flows in human arteries. I will present some techniques we employed to prove the existence of weak solutions, which account for the poor compactness of the left Cauchy-Green tensor. Moreover, I will show recent progress on the global strong well-posedness in two dimensions. This talk is partially based on joint work with Dennis Trautwein (Regensburg).

Keywords: fluid-structure interactions, diffuse interface model, blood thrombus, viscoelastic fluid, Navier-Stokes/Cahn-Hilliard.

References

- [1] Y. Liu, Global well-posedness and long-time behavior of a diffuse interface model for incompressible viscoelastic two-phase flows, in preparation.

- [2] Y. Liu and D. Trautwein, On a diffuse interface model for incompressible viscoelastic two-phase flows, *J. Nonlinear Sci.* **35** (2025), no. 1, Paper No. 12, 71 pp.