



复旦大学数学科学学院 数学综合报告会

报告题目: **Modeling and simulation in interfacial fluid mechanics**

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摘要: Our interest lies in moving boundary problems arising from industrial and engineering applications. In particular, we are interested in the drop or bubble dynamics in multiphase flows, which is subject to external electric fields or contains surfactants. To study the influence of electric fields on fluid dynamics, Taylor's leaky dielectric model has been employed to carry out various analysis and simulations. We investigated the problem where a core-annular flow is setup with radial electric fields in tube. Boundary integral method is used, together with reduced one dimensional model, to study the transient dynamics and drop formations. For the problem with surfactants, the difficult part occurs when soluble surfactants is considered as the traditional method requires solving the advection-diffusion problem in the entire domain. Through matched asymptotic analysis, we are able to reduce the problem to an effective interfacial problem to leading order when the bulk Peclet number is large. This enables us to study the effects of solubility control on the drop dynamics.

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