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Flow of DNA solutions around cylindrical arrays

Monday, 31 May 2021 11:40 (15 minutes)

Complex fluid responses to external forces, imposed at specific lengthscales and forcing amplitudes, are intimately linked to their internal microstructure. Accordingly, microstructure deformation and relaxation history span lengthscales from the microscale to the macroscale. When complex, biological fluids are driven through porous media, a faithful model of the trapped vs. transported fluid mixture, and whether the material remains intact or preferentially separates (a version of material failure), is strongly dependent on multiple interacting chemical and transport processes. These dynamics processes are consequences of properties of the porous medium, the biological fluid, the relative lengthscales of the pore structure and the complex fluid, and medium-fluid component affinities. If the porous medium is fibrous with relative stiff fibers, a "simple" first step is to understand how the fluid behaves around a sphere or a cylinder. We start with a lambda-DNA solution to illustrate how complex even this simple model problem is, with a wide range of behavior. This study is a first step in our main goal of proposing an experimental strategy and analysis of the experimental data to learn the dominant mechanisms governing transport of complex fluids through porous media, and to build a predictive model.

Time Block Preference

Time Block A (09:00-12:00 CET)

References

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Student Poster Award

Primary authors: FOREST, Greg (University of North Carolina at Chapel Hill); VASQUEZ, Paula (University of South Carolina)

Presenter: VASQUEZ, Paula (University of South Carolina)

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