GRADUATE STUDENT RESEARCH SEMINAR SERIES (2017)

SINGULARITY METHOD IN STOKES FLOWS

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Linearized viscous flows also called Stokes flows are an approximation to fluid flows with vanishingly small Reynolds numbers (Re). In the limit of Re→0, the governing Non-linear equations of motion: The Navier-Stokes Equations can be approximated by linear partial differential equations called Stokes equations. These flows are characterized by very small length scales or move with very small velocities or are very viscous or possess a combination of all of the above characteristics. Such flows are encountered in the engineering of microfluidic Lab On a Chip devices and in biological fluid flows such as flows generated by swimming micro-organisms and ciliated surfaces in the human body. We shall discuss a method called the singularity method where elementary solutions of the Stokes equations are superimposed upon each other to yield new solutions that can serve as simple models that capture the essential physics of such problems. Of particular interest to us is the Nonlinear dynamics of finite sized inertial particles advected by such flows. Inertial particles are encountered in microfluidic devices where size based segregation of such particles suspended in fluid flows can have important applications.

MONDAY, SEPTEMBER 25 AT 3:00-4:00 PM

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