GRADUATE STUDENT RESEARCH SEMINAR SERIES (2018)

MODELLING OF EXTERNALLY DRIVEN MAGNETIC MICRO-ROBOTS

SPEAKER: JAKE BUZHARDT

In recent years, artificial microswimmers have received significant experimental and theoretical research attention due to their potential biomedical applications, such as targeted drug delivery and particle manipulation. The propulsion of such micro-robots by an external magnetic field seems particularly promising, as it presents the capability to control the swimmers remotely. With this goal in mind, micro-robots composed of spheres have been explored, as these bodies are easily experimentally realized and may be configured to possess the necessary asymmetries to couple a translational motion to an external torque. In this talk, methods of modelling the motion of these robots and the resulting fluid velocity field are presented and discussed. These include a full numerical simulation using the method of regularized Stokeslets, the construction of mobility matrices, and the development of lower order singularity models. We then explore how these models may be modified to take into account the presence of a solid boundary. Finally, the usefulness of these models for studying fluid mixing and controlling the microrobots is demonstrated.

MONDAY, OCTOBER 8 3:00 PM

EIB 132