PHYSICAL MATHEMATICS SEMINAR

Worm dynamics in heterogenous mediums

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ABSTRACT:

Organisms ranging from bacteria to reptiles can be found in granular beds which are often flooded with water and other matter. Depending on their size and strength, they may move entirely within the pore space or rearrange the material locally in search of food and shelter. We will discuss the dynamics of limbless worm *Lumbriculus variegatus* as a model to understand evolution-based strategies developed by organisms which routinely live and move through such disordered porous environments. The worms are shown to employ elongation-contraction and transverse undulatory strokes to propel themselves through a wide range of mediums. Our analysis in terms of the rheology of the medium shows that the dual strokes can be used by active intruders to move effectively from water through the loose fluidizable surface layers to the well-consolidated bed below. We will demonstrate corresponding motion of magnetoelastic robots depending on the frequency of their undulatory strokes and body elasticity. We will then examine worm foraging in heterogeneous medium modeled as a series of chambers connected by narrow passages where steric interactions with confining walls lead to significant barriers for transport. Their escape time as they collide with the boundaries and locate passages between the chambers will be discussed in terms of a boundary-following random walk model.

TUESDAY, DECEMBER 13, 2022
2:30 PM – 3:30 PM
Building 2, Room 449

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