PRAIRIE MATHEMATICS COLLOQUIUM

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Intracellular transport of intermediate filaments driven by antagonistic motor proteins

Mathematics and Statistics

Date: **Thursday** December 3, 2020
Time: Social tea break at 2:00 PM, talk at 2:30 PM
Zoom link: https://us02web.zoom.us/j/87420316823?pwd=TnBwaGpnQWFvWE5ZZ0xwOXl6UG95dz09

Abstract: Intermediate filaments are one of the components of the cytoskeleton; they are involved in cell mechanics, signalling and migration. The organisation of intermediate filaments in networks is the major determinant of their functions in cells. Their spatio-temporal organization in cells results from the interplay between assembly/disassembly processes and different types of transport.

For instance, intermediate filaments, which are long elastic fibers, are transported in cells along microtubules, another component of the cytoskeleton, by antagonistic motor proteins. How elastic fibers are efficiently transported by antagonistic motors is not well understood and is difficult to measure with current experimental techniques. Adapting the tug-of-war paradigm for vesicle-like cargos, a mathematical model is developed to describe the motion of an elastic fiber punctually bound to antagonistic motors. Combining stochastic and deterministic dynamical simulations and qualitative analysis, we study the asymptotic behaviour of the model, which defines the mode of transport of fibers. The effects of initial conditions, reflecting the intracellular context, model parameters and functionals, describing motors and fiber properties, and noise, outlining other intracellular processes, are characterized.

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