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Intracellular transport driven by antagonistic motor proteins

Intermediate filaments are long elastic fibers that are transported in cells along microtubules 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 [1]. Combining dynamical simulations and qualitative analysis, the asymptotic behavior of the model, which defines the mode of transport of fibers, is studied; the effects of initial conditions, reflecting the intracellular context, and model parameters and functionals, describing motors and fiber properties are characterized.

Work in collaboration with J. Dallon (BYU, Provo, Utah, USA), C. Leduc and S. Etienne-Manneville (Institut Pasteur, Paris, France)

[1] Portet, S., Leduc, C., Etienne-Manneville, S., Dallon, J. Deciphering the transport of elastic filaments by antagonistic motor proteins. *Phys. Rev. E*. 99: 042414 (2019).