Intracellular transport by molecular motors: the effect of number of binding sites

Naruemon Rueangkham[1] and Rhoda Hawkins[1]

[1,]*Department of Physics and Astronomy, University of Sheffield, Sheffield, UK*

Intracellular transport carries a large variety of cargos in many cellular processes. Molecular motors bound to the cargo usually work together in teams. The tails of motors are strictly bound to the cargo whereas the head of motors stepping along the track can bind and unbind from the filament. Interestingly, when rebinding, how far the motors can bind beyond of the width of cargo is unknown. We introduce a latticed based stochastic model to study the effect of the number of accessible binding sites on the filament, on the collective behaviour of molecular motors. We extended the analytical solution for force-velocity relations of a cluster of motors bound on a cargo from [1] by including attachment and detachment and theoretical probability distributions of bound motors with limited and unlimited number of binding sites along the filament. We present analytical and simulation results of probability distributions of bound motors. Moreover, the position or the sequence of motors on the filament can be swapped or preserved during unbinding and rebinding. We show and compare differences between swapping and preserving the the sequence of motor binding on the filament.,

[1] O. Campas, Y. Kafri, K. B. Zeldovich, J. Casademunt, and J.-F. Joanny, “Collective dynamics of interacting molecular motors,” *Phys. Rev. Lett.*, vol. 97, no. 3, p. 38101, 2006.