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Abstract:	Intra-cellular cargo transport on microtubule filaments is predominantly carried out by molecular motors such as kinesins and dyneins. In this thesis, we explore the dynamical properties of cargo transport using Brownian dynamics simulations and specifically look at the effect of the unique detachment characteristics of dynein observed in experiments. Dynein motors show a catch-bond behavior in their detachment rates. We model this behavior and incorporate the same in our simulations. We first look at unidirectional cargo transport in the presence of dynein motors alone. The effective unbinding rate and effective velocity of cargo in the presence of collective motors show behavior similar to that of a single motor. Next, we look at the competition between two sets of motors in bidirectional transport of cargo. We show that in the presence of a dynein catch bond, the transport properties exhibit non-monotonic features, which helps us to understand a paradox in bidirectional transport.
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