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Title:	Effect of catch bonding on transport of cellular cargo by dynein motors
Authors:	Chandel, Sameep (/jspui/browse?type=author&value=Chandel%2C+Sameep) Chaudhuri, A. (/jspui/browse?type=author&value=Chaudhuri%2C+A.)
Keywords:	Dynein motors Behavior Experiments
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Abstract:	Recent experiments have demonstrated that dynein motors exhibit catch bonding behavior, in which the unbinding rate of a single dynein decreases with increasing force, for a certain range of force. Motivated by these experiments, we study the effect of catch bonding on unidirectional transport properties of cellular cargo carried by multiple dynein motors. We introduce a threshold force bond deformation (TFBD) model, consistent with the experiments, wherein catch bonding sets in beyond a critical applied load force. We find catch bonding can result in dramatic changes in the transport properties, which are in sharp contrast to kinesin-driven unidirectional transport, where catch bonding is absent. We predict that under certain conditions, the average velocity of the cellular cargo can actually increase as applied load is increased. We characterize the transport properties in terms of a velocity profile plot in the parameter space of the catch bond strength and the stall force of the motor. This plot yields predictions that may be experimentally accessed by suitable modifications of motor transport and binding properties.
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