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Title:	Persistence in Brownian motion of an ellipsoidal particle in two dimension
Authors:	Ghosh, A. (/jspui/browse?type=author&value=Ghosh%2C+A.) Chakraborty, D. (/jspui/browse?type=author&value=Chakraborty%2C+D.)
Keywords:	Stochastic systems Analytical expressions Brownian particles Rotational diffusivity Tracking techniques
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Citation:	Journal of Chemical Physics, 152(17)
Abstract:	We investigate the persistence probability $p(t)$ of the position of a Brownian particle with shape asymmetry in two dimensions. The persistence probability is defined as the probability that a stochastic variable has not changed its sign in the given time interval. We explicitly consider two cases-diffusion of a free particle and that of a harmonically trapped particle. The latter is particularly relevant in experiments that use trapping and tracking techniques to measure the displacements. We provide analytical expressions of $p(t)$ for both the scenarios and show that in the absence of the shape asymmetry, the results reduce to the case of an isotropic particle. The analytical expressions of $p(t)$ are further validated against numerical simulation of the underlying overdamped dynamics. We also illustrate that $p(t)$ can be a measure to determine the shape asymmetry of a colloid and the translational and rotational diffusivities can be estimated from the measured persistence probability. The advantage of this method is that it does not require the tracking of the orientation of the particle.
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