ANOMALOUS DIFFUSION: SINGLE PARTICLE TRAJECTORY ANALYSIS

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S u m m a r y

Single particle tracking data are usually analyzed in terms of the mean square displacement (MSD) which exhibits, in the case of Brownian particles undergoing the anomalous diffusion, a time dependence that is slower (subdiffusion) or faster (superdiffusion) than a linear one. The particle velocity autocorrelation function (VAF), which is directly related to the underlying dynamics of the host medium that brings about the anomalous diffusion, can then be obtained as the second time derivative of MSD. We examine the possibility to obtain the mean velocity autocorrelation function (MVAF) directly from the particle trace data and analyze its relation to the true VAF for an instantaneous velocity. So long as the sampling time interval is much shorter than the correlation time, MVAF gives an accurate estimate of VAF. Data analysis procedures are illustrated, by using the data generated within a simple stochastic model of superdiffusion.