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Evaluating linear response in active systems with no perturbing field: Application to the calculation of an effective temperature[1]
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We present a method for the evaluation of time-dependent linear response functions for systems of active particles propelled by a persistent (colored) noise from unperturbed simulations. The method is inspired by the Malliavin weights sampling method proposed earlier for systems of (passive) Brownian particles. We illustrate our method by evaluating a linear response function for a single active particle in an external harmonic potential. As an application, we calculate the time-dependent mobility function and an effective temperature, defined through the Einstein relation between the self-diffusion and mobility coefficients, for a system of active particles interacting via a screened-Coulomb potential. We find that this effective temperature decreases with increasing persistence time of the self-propulsion. Initially, for not too large persistence times, it changes rather slowly, but then it decreases markedly when the persistence length of the self-propelled motion becomes comparable with the particle size.

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