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Effective temperature determines density distribution in a slowly varying external potential beyond linear response GRZEGORZ SZAMEL, MIN ZHANG, Department of Chemistry, Colorado State University — We consider a sheared colloidal suspension under the influence of an external potential that varies slowly in space in the plane perpendicular to the flow and acts on one selected (tagged) particle of the suspension. Using a Chapman-Enskog type expansion we derive a steady state equation for the tagged particle density distribution. We show that for potentials varying along one direction only, the tagged particle distribution is the same as the equilibrium distribution with the temperature equal to the effective temperature obtained from the violation of the Einstein relation between the self-diffusion and tagged particle mobility coefficients. We thus prove the usefulness of this effective temperature for the description of the tagged particle behavior beyond the realm of linear response. We illustrate our theoretical predictions with Brownian dynamics computer simulations.

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