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Identifying global system parameters from microscopic data[1]
MEGAN STANLEY, Cavendish Laboratory, University of Cambridge, TORBEN OTT, MICHAEL BONITZ, Institute of Theoretical Physics and Astrophysics, University Kiel — A dissipative Yukawa model is often employed to describe strongly coupled systems such as dusty plasmas. It is fully described by three parameters: i) The coupling parameter Γ, ii) the screening parameter κ and iii) the friction coefficient ν. These three parameters fully govern the structural and dynamical properties of the system which can be obtained, for example, through molecular dynamics simulations. In this contribution, we follow the reverse path and pose the question: Is it possible to obtain, from the microscopic phase- space trajectories of the system alone, the governing parameters? It has been shown previously that the short-range order depends on a non-unique combination of κ and Γ [1]. We therefore extend our analysis to dynamical quantities such as the mean-squared displacement to establish a mapping between the system's parameters and its microscopic behaviour. Our results should be directly applicable as a non-invasive diagnostic method for dusty plasma experiments.

[1] Hartmann *et al.*, Phys. Rev. E, **72**, 026409 (2005)

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