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Intra-shell diffusion in Yukawa balls PAUL LA PLANTE, Loyola University Maryland, TORBEN OTT, MICHAEL BONITZ — Diffusion of micrometer sized particles has recently been studied in dusty plasmas. When examined experimentally and theoretically in the 2D and quasi-2D case [1], superdiffusion was observed, i.e. the mean-squared displacement of the particles in the long time case was larger than that predicted by the Einstein relation $\langle |r(t)|^2 \rangle \sim t$. In the case of superdiffusion, the mean-squared displacement grows as t^α, where $\alpha > 1$. In this contribution, we study spherically confined small dust clusters where the particles arrange in a series of concentric spherical shells. We present the results of molecular dynamics simulation, both in the case where the coupling parameter $\Gamma = (Q^2/4\pi\epsilon_0) \times (1/a_{ws}k_BT)$ is held constant and the inverse screening parameter varies and vice versa. We also examine different particle numbers that lead to between one and three shells of the Yukawa ball. In most cases studied, normal diffusion or subdiffusion ($\alpha < 1$) was exhibited by the dust particles on the shells.

[1] T. Ott, M. Bonitz, Z. Donkó, and P. Hartmann, PRE 78, 026409 (2008)

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