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Relaxation Time Scales for Dense Granular Systems SHAOLIN MAO, Mechanical Engineering Department, University of Texas at El Paso — In study of shock waves, it is a common practice to assume that the thickness of a shock wave in thin, and that the equation of state of the material is applicable before and after the shock. While these assumptions are correct on gases with simple molecules. These assumptions need to be reexamined for granular systems, especially for dense granular systems, because the time scale to reestablish a steady or equilibrium state after an external perturbation could be comparable to the time scale of the physical problem itself. We study the physical time scales of particulate systems by using discrete element method (DEM). First, a simple shear force is imposed to a system with periodic perturbation of energy to mimic the temperature field. The calculation of contact stress and the velocity fluctuation shows the stress relaxation mechanism and the process of the system recovery to its original state after an external perturbation. In this talk, we also discuss the relationship between the segregation of a system and the stress relaxation of the symmetric and asymmetric components.

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