Loss of Memory in Dense Sheared Particulate Systems

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ABSTRACT

We carry out discrete element/MD simulations of dense sheared particulate systems, with the focus on understanding and characterizing dynamical properties of force networks that develop on the mesoscale. These force networks are known to play a crucial role in connecting microscale dynamics of the particles and macroscopic properties of the whole system. The results of the simulations are analysed using topological tools [1,2,3], that allow to fully quantify and even compare the states of the system. These tools identify in an objective and precise manner the time interval needed for the system to loose its memory, or in other words, the time interval after which any information about system state is lost. We will show that the process of memory loss may differ even if the inertial number, measuring the ratio of inertial to imposed forces, is kept constant.

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