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Cooperative rotations of 2d frictional disks under oscillatory shear MITCHELL MAILMAN, MICHELLE GIRVAN, WOLFGANG LOSERT, university of Maryland — We explore the dynamics of the contact network under cyclic shear, with a particular focus on cooperative rolling and sliding contacts, using a molecular dynamics (MD) simulation approach and external fixed pressure. We systematically study the formation and persistance of clusters of cooperatively rolling grains for a range of reversal amplitudes. The propensity for cooperative rotation dictates structural properties of the contact network: loop configurations of even numbers of grains are able to rotate without sliding, while odd numbers of grains must have at least one sliding contract. We report on the statistics of loop structures in the contact network, as well as their relationships to cooperatively rotating grains. Finally, we demonstrate a characteristic scale over which grains can cooperatively rotate as well as the dependence on friction parameters.

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