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Transition in a granular chute flow due to periodic and aperiodic perturbations BHARATHRAJ S, KUMARAN V, Department of Chemical Engineering, IISc Bangalore — Granular flow down an inclined plane exhibits a transition from a disordered,random state to an ordered state with layers of particles with in-layer hexagonal order, when there is a small change in the roughness of the base. In earlier studies,a rough base was created using a random arrangement of frozen particles at the base,and the roughness was varied by varying the ratio of the frozen and moving particle diameters.Here,the effect of a different form of base roughness,which is sinusoidal perturbations of varying amplitude and wavelength,is also examined. The transition from an ordered to disordered state is also observed when a sinusoidal base is used, when the amplitude of the sine wave increases beyond a critical value.The critical amplitude initially increases as the wavelength is increased, reaches a maximum and then decreases as the wavelength is further increased. The critical amplitude also increases as the height of the flow increases.The states induced by the sinusoidal base have peculiar transient features, where there is a tendency to order at intermediate times in disordered states, unlike the rough base where no such tendency is observed.We also formulate a boundary layer theory for the ordered state, which develops in two distinct stages of shear propagation

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