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Oblique impact of dense granular sheets JAKE ELLOWITZ, NICHOLAS GUTTENBERG[1], HEINRICH M. JAEGER, SIDNEY R. NAGEL, WENDY W. ZHANG, Department of Physics and the James Franck Institute, University of Chicago, Chicago, IL 60637 — Motivated by experiments showing impacts of granular jets with non-circular cross sections produce thin ejecta sheets with anisotropic shapes, we study what happens when two sheets containing densely packed, rigid grains traveling at the same speed collide asymmetrically. Discrete particle simulations and a continuum frictional fluid model yield the same steady-state solution of two exit streams emerging from incident streams. When the incident angle $\Delta\theta$ is less than $\Delta\theta_c = 120^\circ \pm 10^\circ$, the exit streams' angles differ from that measured in water sheet experiments. Below $\Delta\theta_c$, the exit angles from granular and water sheet impacts agree. This correspondence is surprising because 2D Euler jet impact, the idealization relevant for both situations, is ill posed: a generic $\Delta\theta$ value permits a continuous family of solutions. Our finding that granular and water sheet impacts evolve into the same member of the solution family suggests previous proposals that perturbations such as viscous drag, surface tension or air entrapment select the actual outcome are not correct.

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