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Still waters: deadzone formation in granular jet impact JAKE ELLOWITZ, HERVE TURLIER[1], NICHOLAS GUTTENBERG, WENDY W. ZHANG, SIDNEY R. NAGEL, James Franck Institute, Chicago, IL — When a densely packed jet of non-cohesive grains collides with a target, a deadzone of stagnant particles forms within the jet. Analogous deadzones form when a droplet of dense suspension hits a substrate, a process important in coating and inkjet printing. In a different context, the formation of planets depends on successive collisions and aggregation of centimeter sized dust particles. The growth process is only possible if a deadzone is deposited onto the larger particle. Using experiments, discrete particle simulations and continuum modeling, we elucidate factors leading to deadzone formation in the collisions in noncohesive dense granular jet impact. We find that a frictional fluid model quantitatively reproduces the structure and stresses observed in both experiment and simulation. A deadzone does not form when the target is frictionless. In contrast, when the target shape is changed from a flat circular disk to a cone, the size of the deadzone decreases continuously with the cone angle.

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