

Abstract Submitted
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Erosion of a cohesive granular material by an impinging turbulent jet¹ MINGZE GONG, UC Santa Barbara, ADRIEN GANS, IUSTI, Aix Marseille Univ, CNRS, PHILIPPE GONDRET, FAST, Paris-Sud University, CNRS, ALBAN SAURET, UC Santa Barbara — The erosion of a cohesive soil by an impinging turbulent jet is observed, for instance, during the landing of a spacecraft and is often an undesirable effect. But this situation is also used in the so-called “jet erosion test” to obtain valuable information on the mechanical properties of the soil using empirical laws. To provide a quantitative understanding, we perform experiments using a cohesion controlled granular material that allows us to finely tune the cohesion between particles while keeping the other properties constant. We then investigate the response of this cohesive granular bed when subjected to an impinging normal turbulent jet. We characterize experimentally the effects of the cohesion on the erosion threshold and the development of the crater. We demonstrate that the results can be rationalized by introducing a cohesive Shields number that accounts for the inter-particles cohesion force. The results of our experiments highlight the crucial role of cohesion in erosion processes.

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