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Giant drag reduction due to interstitial air in sand DEVARAJ VAN DER MEER, University of Twente, The Netherlands, TESS HOMAN, Laboratoire de Physique, ENS Lyon, France — When an object impacts onto a bed of very loose, fine sand, the drag it experiences depends on the ambient pressure in a surprising way: Drag is found to increase significantly with decreasing pressure. We use a modified penetrometer experiment to investigate this effect and directly measure the drag on a sphere as a function of both velocity and pressure. We observe a drag reduction of over 90% and trace this effect back to the presence of air in the pores between the sand grains. Finally, we construct a model based on the modification of grain-grain interactions that is in full quantitative agreement with the experiments.

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