

Abstract Submitted
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Investigation of the rate dependence of long-rod penetration of granular media using an improved Digital Speckle Radiography program

JOHN ADDISS, ADAM COLLINS, WILLIAM PROUD, University of Cambridge — Digital Speckle Radiography (DSR) is a technique allowing full field displacement maps in a plane within an opaque material to be determined. The displacements are determined by tracking the motions of small sub-sections of a deforming speckle pattern, produced by seeding an internal layer of lead and taking flash x-ray images. Using a digital image cross correlation program, written and optimised for DSR experiments, the temporal progression of a long-rod (100 mm long, 10 mm diameter) penetrating a granular sample at a variety of rates is investigated. Quasi-static rates of 1.5 mm per min are achieved using an Instron machine, 5 m/s is achieved using a drop-weight and 200 m/s is achieved using a gas gun. These experiments are carried out using a series of time delayed flash x-ray images. The subsequent data sheds considerable light on the response of granular materials to penetration at a variety of rates.

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