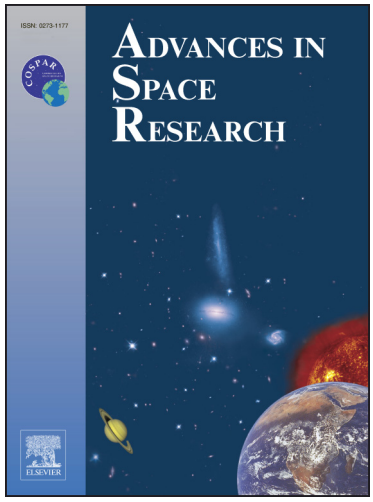

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Detection of structure in asteroid analogue materials and Titan's regolith by a landing spacecraft

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Abstract

We compare measurements made by two impact penetrometers of different sizes and with different tip shapes to further understand penetrometer design for performing pentrometry on an asteroid. To this end we re-visit the interpretation of data from the Huygens' penetrometer, ACC-E, that impacted Titan's surface. In addition we investigate the potential of a spacecraft fitted with a penetrometer to bounce using a test rig, built at The Open University (UK).

Analysis of ACC-E laboratory data, obtained from impacts into ∼4 mm diameter gravel, was found to produce an unusual decrease in resistance with depth (force-depth gradient) which was also seen in the Huygens' ACC-E data from Titan and originally interpreted as a wet or moist sand. The downward trend could also be reproduced in a hybrid Discrete Element Model (DEM) if it was assumed that the near surface particles are more readily

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