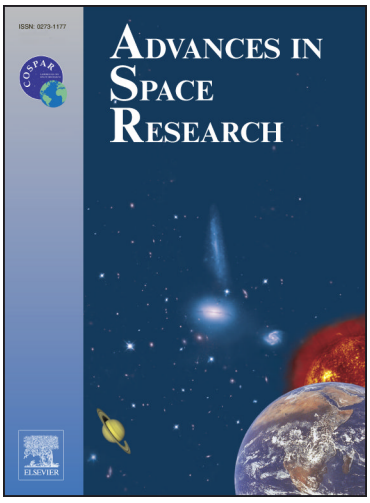

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Numerical simulations of the contact between the lander MASCOT and a regolith-covered surface

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Abstract

In 2018, the mother spacecraft of the Hayabusa2 mission will release the lander MASCOT above the surface of the asteroid (162173) Ryugu. The lander will impact the regolith layer of the asteroid at low speed. While the descent trajectory of MASCOT is well determined before its release, its behavior once it touches the surface of Ryugu remains a great unknown. Predictions of the contact properties as a function of the assumed regolith properties and landing geometry (e.g., energy after bounce if not zero, collision duration...) are extremely valuable in terms of landing site selection and interpretation of the data acquired during and after landing. In this study, we use the *N*-body code `pkdgrav` to perform more than 480 numerical simulations of the first contact between the lander MASCOT and a granular medium representing the regolith layer. We explore the influence of several input parameters on the outcomes of the contact. These parameters are related to the lander, the grains of the regolith and the layer thickness. We identify a certain number of trends for the lander's behavior, depending on the configuration of the contact, and perform a statistical analysis of the

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