

DISCRETE ELEMENT MODELING OF BUCKET DRUM-LUNAR REGOLITH INTERACTIONS

Speaker

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Abstract

In this work, a discrete element model (DEM) is developed for the IPEX bucket drum-lunar regolith system. Model parameters are calibrated using available BP-1 lunar simulant experimental test data. The calibrated model is then applied to simulate a target IPEX drum-regolith system. Modeling the IPEX drum motion using a force controller has shown that the excavation force and the torque behavior can be modeled with a reasonable amount of accuracy when evaluated against experiment data. The mass accumulation rates from simulations matched reasonably with those from physical experiments. The lunar gravity simulation yielded a lower excavation force and torque on the drum than the earth gravity simulation. This study has laid the groundwork for analyses of other IPEX drum sizes and translational speeds and for the coupling of DEM with advanced control models for more accurate force and torque evaluations.

Biography

Dr. Qiushi Chen is a Professor of Civil Engineering at Clemson University. His research focuses on geomechanics and the computational modeling of granular materials and geomaterials. Dr. Chen chairs the ASCE Computational Geotechnics Committee and serves on review panels for multiple federal funding agencies. He is a member of the editorial board for Computers and Geotechnics and co-edits special issues for several other journals. Dr. Chen received his Ph.D. from Northwestern University and his bachelor's degree from Shanghai JiaoTong University.



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