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Deflection effect in the interaction between granular flow and semi-ellipsoid obstacle array

Wangxin Yu, Su Yang, Xiaoliang Wang, and Qing-quan Liu

Beijing Institute of Technology, Beijing Institute of Technology, School of Aerospace Engineering, China

(ywxinmary@qq.com)

Granular flow impacting structures is an important problem in the research of providing scientific basis for disaster prediction and mitigation, so it is of great significance to deepen the understanding of the interaction law. We studied the spread and deposit behaviors of fast granular flow impacting an array of semi-ellipsoid obstacles with different parameters such as the height, distribution density and deflection angle. It is found that the flow and deposit state of granular matter are controlled by the obstacle array through both dissipation and deflection effect. We quantified the deposit behavior by two dimensionless indices, one pre-existing index called runout efficiency, and a new proposed index termed as deflection efficiency. This work would provide help in designing protective obstacle arrays by exploring the relationship between regulation effect and parameters of the obstacle array.