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On the dependency of jumps on particle shape in bedload transport of monodisperse non-spherical particles

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Accurate prediction of sediment transport is highly desirable because of its key importance in many environmental and industrial applications. One way to approach this is to measure the length and height of the jump of a moving particle. This led to many studies dealing with the quantification of a particle jump. Nevertheless, few experiments have been performed to understand the effect of particle shape on its jump. A dataset of jumps of differently shaped particles has been generated by the authors from direct numerical simulations of bedload transport in a turbulent open channel flow. A total of four simulations were performed with a large number of mobile single shaped, mono-disperse particles. Four ellipsoidal shapes were used in these simulations, i.e. oblate, prolate, sphere, and a generally shaped ellipsoid. In the present contribution, statistical properties of the jump trajectories such as ejection and landing angles, flight length, height, and time, etc. will be reported. Mean jump trajectories for different particle shapes were calculated using the Dynamic-Time-Warping algorithm. The analysis provides a quantification of the different behavior of the particles under the present conditions. For example, it is observed that oblate particles travel a maximum distance in a jump, while spherical particles take small jumps but more often.