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# Crossing approaches to better understand (and model) bedload transport and granular media

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Bedload transport can be seen as an interaction between a granular medium and a fluid flow. This perspective and the associated modelling can benefit to both field, by on one hand considering a granular media approach to better understand and model bedload transport, and on the other hand challenging classical granular media description analyzing the complex bedload transport configuration.
The present approach is developed using numerical simulations at the particle scale together with a theoretical modelling approach based on two-phase continuum model. Bedload transport is used as a rheometer to span the whole granular regimes as a function of the depth with each simulation. While the results challenges granular regime transition description, a mu(I) approach is shown to describe bedload transport at first order in a two-phase continuous model. In a second time, starting from a theoretical analysis of the slope influence in bedload transport from the granular perspective, keys are given to understand the evolution of the vertical granular structure as a function of physical parameters and a scaling law for bedload transport is predicted and recovered in numerical simulations. The latter evidences the central role of the granular threshold of motion and of hysteresis for bedload transport modelling and leads us to study these phenomena in dry granular flows to better understand and model granular media and more generally geophysical processes.

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