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Numerical study of transients in bedload transport

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Sediment transport is an important process for the formation of patterns in nature. The reference case of steady and homogeneous transport has been much studied, with calibrated transport laws for the different modes of transport. In comparison, transients, both in time and space, which are crucial for the development of instabilities leading to those patterns, have been overlooked and their characteristics are much less known. This is especially true in the case of bedload, for which time and length scales associated with these transients are too small to be easily measured in experiments. Here, we investigate bedload by means of numerical simulations where a discrete element method (DEM) for the grains is coupled to a continuum description of the water flow (RANS equations). We specifically address the temporal response of the transport in the transition between two close steady states.