

SPATIOTEMPORAL CHAOS IN RIVER SEDIMENT TRANSPORT

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We consider the motion of granular sediments on a river bed under the action of water flow. The phenomenon is modeled, as usual, by means of three nonlinear partial differential equations, whose solution can generally be found only by means of numerical integration. When an

unerodible bed underlies the granular layer, numerical simulations give rise to a sediment motion based on an intermittent shedding of sediment clusters. This kind of motion can be observed both in nature and in mathematical simulations. Despite the purely deterministic nature of the model, the intermittency is random.

Our goal is to understand whether the model behaviour is induced by the numerical integration scheme or is intrinsic to the differential equations. Due to the complexity of the original model, we investigate first some simplified versions of it, which are valid over a well defined range of spatial and temporal scales. The resulting coupled map lattice models are proved to generate spatio-temporal chaotic behaviour or not depending on the parameters values.