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# An N-point-mass landslide model

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We present a semianalytical model capable of computing the motion of N point-masses interacting and sliding over a surface. The motion is described through a system of differential equations, that is solved by an explicit Runge-Kutta scheme. The forces acting on the masses are gravity, the reaction force of the surface, friction, and the interaction force. This latter is introduced by imposing that the geometrical distance between each mass is constant. During the motion, the point-masses remain strictly adherent to the surface, i.e. the masses can neither leap nor roll, but only slide down the surface. The point-masses grid is built through a 2D Delaunay triangulation. We present simulations over analytical surfaces and real topographies. In this latter case, we focus our attention on the numerical instability related to the solution of the differential equations system. In fact, it has been observed that in case of a large number of particles sliding over real topographies, the problem is ill-conditioned, providing less accurate results, and needs proper regularization algorithms. Overall, this study sets the basis for a generalization to more complex systems of masses, such as 3D matrixes of blocks that are often used to model processes such as landslides and rockfalls.