



## **Meshfree simulation of avalanches with the Finite Pointset Method (FPM)**

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Meshfree methods are the numerical method of choice in case of applications which are characterized by strong deformations in conjunction with free surfaces or phase boundaries. In the past the meshfree Finite Pointset Method (FPM) developed by Fraunhofer ITWM (Kaiserslautern, Germany) has been successfully applied to problems in computational fluid dynamics such as water crossing of cars, water turbines, and hydraulic valves. Most recently the simulation of granular flows, e.g. soil interaction with cars (rollover), has also been tackled. This advancement is the basis for the simulation of avalanches.

Due to the generalized finite difference formulation in FPM, the implementation of different material models is quite simple. We will demonstrate 3D simulations of avalanches based on the Drucker-Prager yield criterion as well as the nonlinear barodesy model. The barodesy model (Division of Geotechnical and Tunnel Engineering, University of Innsbruck, Austria) describes the mechanical behavior of soil by an evolution equation for the stress tensor.

The key feature of successful and realistic simulations of avalanches - apart from the numerical approximation of the occurring differential operators - is the choice of the boundary conditions (slip, no-slip, friction) between the different phases of the flow as well as the geometry. We will discuss their influences for simplified one- and two-phase flow examples.

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