Geophysical Research Abstracts
Vol. 13, EGU2011-10903, 2011
EGU General Assembly 2011

Theoretical interpretation of behaviour of a new rheometer for mud and debris flows

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The paper deals with the theoretical interpretation of the experimental results of a new rheometer apparatus aimed at determining the viscous properties of materials produced during fast landslides type mud and debris flows. The new equipment is a drag ball rheometer defined SDR (Sphere Drag Rheometer) firstly introduced by Schatzmann as a modification of conventional standard rheometer. The new system measures the force required to move a sphere of variable radius into the fluid at different velocities, the well known drag coefficient. Comparing with the standard rheometers, this device uses much higher volume of mixtures of appropriate size and then, next to the real.
The behaviour of the system has been studied theoretically by the COMSOL Multiphysics software (CFD Module). A comparison of laboratory and theoretical results is carried out with different liquids and mixtures of water and soils. Through a parametric analysis has been highlighted the influence of all relevant geometric factors and the influence of test procedures.