Geophysical Research Abstracts
Vol. 20, EGU2018-13309, 2018
EGU General Assembly 2018

Dry granular flows of monodisperse particles: an optical method to compute the particles flow field

Giulia Rossi, Niccolò Bisagno, and Aronne Armanini
University of Trento, Trento, Italy (giulia.rossi@unitn.it)

Environmental granular flows are characterized by a mixture of solid particles and an interstitial fluid, usually air (snow avalanches, rock avalanche, pyroclastic avalanches) or water (debris flows). Because of the complexity of this type of flows their dynamics is still an open problem: it is arduous the definition of a single constitutive law, which properly describes all the possible flow regimes, very different between each other.

One of the main problems in defining proper constitutive relations is the difficulty in measuring the flow field property (e.g. particles velocity, volume fraction, granular temperature), even in a controlled laboratory environment.

In particular, we are interested in computing both the average and instantaneous values of the particles velocities and volume fraction. This allows to analyze in depth the fluctuation in time of the particles properties and eventually investigate the correlations between the concentration and velocity fluctuations.

We present an optical method to compute the flow field main properties. The particles centres are detected using the watershed algorithm. Computing the volume fraction, the incidence of each particle depends on how much it overlaps with nearby particles. Regarding the velocities of the particles, the good features to track algorithm has been adopted to extract the features in the image; then the optical flow technique is employed to track the detected features. The single particle velocity is the average of the features velocities contained within the particle area.