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# Numerical simulations of granular avalanches overflowing a dam: towards an understanding of the impact pressure signal

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Snow avalanches may be highly destructive. Then a good understanding of avalanche impact pressure on structures is crucial in snow engineering. We simulated avalanches by 2D unsteady granular flows on a rough inclined plane using Discrete Elements Method. We first measured the evolution in time of the Froude number and the compacity for a large range of inclination angles. It let us to distinguish three flow phases: a dilute avalanche front, a quasi-steady core and a long time duration tail. Recent flow rules, established for steady and uniform granular flows, appeared to be satisfied for the core and the tail. Secondly a dam, normal to the incoming stream, was introduced in the flow. The influence of the inclination angle on the impact pressure signal was then studied. We analyzed (i) the averaged pressure signal and (ii) the high frequency fluctuations. The averaged signal analysis allowed us to derive the drag coefficient evolution with the Froude number of the incoming flow. Studying the fluctuations at the grain scale showed the importance of the force network restructurations occurring inside the dead zone formed upstream of the dam.