Improvements on an existing testing device to study post-peak shear behavior of snow

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The knowledge of the mechanical behavior of snowpack is a key requirement to understand snow avalanche triggering processes. Even if snow is a material constituted only by almost pure water, it shows large variations of strength and deformability both in space, like all natural geomaterials, and in time, on a scale comparable to the duration of an experiment. Engineering approaches require appropriate testing devices able to catch and highlight the behavior of the material. An apparatus for direct shear tests on snowpack has been designed and used so far for assessing the shear strength of layered snowpack. Briefly, the device consists in two parts: a bottom fixed part and a top moving drawer. The intact sample is inserted into the device and the force to move the drawer and its displacement are recorded. In its original version, the motion of the drawer was applied through a pneumatic actuator. This configuration allowed force controlled tests which permit to assess the peak shear strength of the tested specimen, only.

The device has been recently improved through the installation of a stepper motor for performing displacement controlled tests. An additional corrugated cap has been added for better transfer the lateral force. In this enhanced mechanical configuration, the device allows to study post-peak behavior of the material. Preliminary results are reported to show its capability.