Model comparison of constitutive laws of snow avalanches

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Abstract

Avalanche hazard zoning is an important task to reduce the danger to human live in alpine regions. The numerical avalanche models depend on a proper description of the relation between the internal stress and the deformation of snow, the constitutive relation. Currently only ad-hoc constitutive relations are implemented. For more reliable statements the inverse problem of finding the constitutive relation most properly describing the observed behaviour must be solved. Velocity profile measurements of snow flowing down a chute (34m x 2.5m) are used for model comparison of recently proposed models (eg. Herschel-Bulkley model and the Cross model). The results and the physical implications are discussed.

Key Words: Model comparison, Bayesian Analysis, Avalanche dynamics