

Numerical modeling of fracture propagation in slabs

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We present the results of numerical simulations of tensile failure of snow samples. Several material models for quasibrittle tensile failure were implemented using an open source finite element code. The models simulate continuum strain softening and distributed cracking and damage as approximations for the distributed cracking of bonds between snow grains in the tensile failure of snow slabs. Each failure model has slightly different formulations, assumptions and parameterizations, and these were compared from the perspective of computational efficiency, mesh objectivity and correspondence with observed test results. Model parameters such as the elastic modulus, tensile strength and fracture energy were derived or directly measured in laboratory three point bending tests. Animated simulations of the numerical failure process are shown and compared to high speed films of the laboratory tests to highlight the evolution of the principal stresses, strain localization and crack propagation in the models.