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Physical vulnerability of reinforced concrete buil impacted by snow avalanches

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Abstract. This paper deals with the assessment of physical vulnera civil engineering structures to snow avalanche loadings. In this cas vulnerability of the element at risk is defined by its damage level e on a scale from 0 (no damage) to 1 (total destruction). The vulnera a building depends on its structure and flow features (geometry, mechanical properties, type of avalanche, topography, etc.). This n difficult to obtain vulnerability relations. Most existing vulnerability have been built from field observations. This approach suffers from scarcity of well documented events. Moreover, the back analysis is on both rough descriptions of the avalanche and the structure. To overcome this problem, numerical simulations of reinforced concret structures loaded by snow avalanches are carried out. Numerical simulations allow to study, in controlled conditions, the structure b under snow avalanche loading. The structure is modeled in 3-D by finite element method (FEM). The elasto-plasticity framework is use represent the mechanical behavior of both materials (concrete and bars) and the transient feature of the avalanche loading is taken i account in the simulation. Considering a reference structure, sever simulation campaigns are conducted in order to assess its snow avalanches vulnerability. Thus, a damage index is defined and is b global and local parameters of the structure. The influence of the geometrical features of the structure, the compressive strength of concrete, the density of steel inside the composite material and th maximum impact pressure on the damage index are studied and a These simulations allow establishing the vulnerability as a function impact pressure and the structure features. The derived vulnerabil functions could be used for risk analysis in a snow avalanche conte

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