



Flexible rockfall barriers subjected to tree impact

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Caused by heavy storms or forest works, deracinated or cut trees and logs can slide or fall down steep slopes. They present a dangerous hazard to people and infrastructure located below. In case of preemptively installed flexible rockfall barriers, these systems have to be able to resist this hazard as well as rockfall. In order to analyze the requirements for such barriers, systematic field tests were carried out in 2004 by the Swiss Federal Research Institute WSL at the rockfall test site Walenstadt in Switzerland. A 1000 kJ flexible barrier has been installed to the vertical rock face of the test site and loaded successively with three vertically released logs. The up to 15 m long logs had a weight of up to 2000 kg and reached an impact velocity of 25 ms^{-1} . The impact energies were: 160 kJ, 320 kJ and 620 kJ. The test instrumentation consisted of 500 kN load cells and 250 Hz digital high-speed video cameras. All three trees were completely stopped by the barrier without any damage to bearing parts. The brake elements worked as expected from comparable rockfall tests. Considering the data gained in these tests, design guidelines for the dimensioning of flexible barriers subjected to tree impact are proposed in this paper. Also a case study is presented, where the tested 1000 kJ barrier was applied in the project “Poschiavo” to protect railway infrastructure from tree fall.