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# Rockfall vulnerability assessment for reinforced concrete buildings

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Abstract. The vulnerability of buildings to the impact of rockfalls is
that has recently attracted increasing attention in the scientific lite
The quantification of the vulnerability, when based on empirical or
approaches requires data recorded from historical rockfalls, which
always available. This is the reason why appropriate alternatives a
required. The use of analytical and numerical models can be one of
In this paper, a methodology is proposed for the analytical evaluat
the vulnerability of reinforced concrete buildings. The vulnerability i
included in the risk equation by incorporating the uncertainty of the
location of the rock block and the subsequent damage level. The o
a weighted vulnerability that ranges from 0 to 1 and expresses the
potential damage that a rock block causes to a building in function
velocity and size. The vulnerability is calculated by the sum of the p
of the probability of block impact on each element of the building a
associated damage state, the latter expressed in relative recovery
terms. The probability of exceeding a specific damage state such a
structural, local, partial, extensive or total collapse is also importar
quantification of risk and to this purpose, several sets of fragility c
various rock diameters and increasing velocities have been prepar
example is shown for the case of a simple reinforced concrete build
impact energies from 0 to 4075 kJ.

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