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Optimal Mitigation of Slopes by Probabilistic Methods

Authors : D. De-León-Escobedo, D. J. Delgado-Hernández, S. Pérez

Abstract : A probabilistic formulation to assess the slopes safety under the hazard of strong storms is presented and illustrated through a slope in Mexico. The formulation is based on the classical safety factor (SF) used in practice to appraise the slope stability, but it is introduced the treatment of uncertainties, and the slope failure probability is calculated as the probability that SF<1. As the main hazard is the rainfall on the area, statistics of rainfall intensity and duration are considered and modeled with an exponential distribution. The expected life-cycle cost is assessed by considering a monetary value on the slope failure consequences. Alternative mitigation measures are simulated, and the formulation is used to get the measures driving to the optimal one (minimum life-cycle costs). For the example, the optimal mitigation measure is the reduction on the slope inclination angle.

Keywords : expected life-cycle cost, failure probability, slopes failure, storms
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