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**Random sets of probability measures in slope hydrology and stability analysis**

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**Abstract**

When the variables  $(x_1, \dots, x_{n+q})$  of a function  $y = g(x_1, \dots, x_{n+q})$  are described by a joint probability distribution over variables  $x_1, \dots, x_n$  and a random relation over variables  $x_{n+1}, \dots, x_{n+q}$ , the dependent variable  $y$  is described by a random set of probability measures. Starting with a brief review of the theory of random sets, the formalism of a random set of probability measures is introduced. One approach to constructing a random set from a set of interval estimates from different sources is reviewed. The use of random sets of probability measures is demonstrated in the practical context of an integrated slope hydrology and stability model called CHASM. When the parameters defining the slope stability problem are described by a random set of probability measures the analysis using CHASM generates a lower and upper cumulative probability distribution on the slope Factor of Safety. It is demonstrated how point measurements can be used to update prior imprecise information on geotechnical parameters.