

SEISMIC FRAGILITY OF MÜHLEBERG DAM USING NONLIENAR ANALYSIS WITH LATIN HYPERCUBE SIMULATION¹

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ABSTRACT

A series of nonlinear seismic evaluations was performed to determine seismic fragility of the Mühleberg Dam as part of the Seismic Probabilistic Risk Analysis (SPRA) of the Mühleberg Nuclear Power Plant (KKM). Probabilistic seismic evaluation was performed by Latin Hypercube Simulation (LHS). Equal probability bins of significant variables were populated with values based on their probability distributions. The variable values were randomly assigned to a total of thirty simulations following the LHS methodology. Nonlinear finite element models of two sections of the dam were developed and analyzed first including all variables, and later including only random variables. These evaluations demonstrated that the seismic capacity of the Mühleberg Dam is controlled by the powerhouse section of the dam and that it is significantly higher than the value obtained from simplified calculations. Failure occurs in the form of sliding through a slip surface that passes through a mudstone layer at the elevation of the bases of the upstream and downstream shear keys.

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