
A Study of the Probability of Seismic Failure for Underground Structures Using Earthquake-resistant Reinforcement

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Underground structures are recently being reinforced against earthquakes by the ground solidification body method. After the Great Eastern Japan Earthquake, the evaluation of seismic safety using the probability theory for seismic motions beyond the assumed design parameters is seen as an important tool in determining uncertain quality in the ground solidification body.

In this report, the nonlinear earthquake response analysis of a box culvert by a two-dimensional FEM was conducted and a fragility analysis was performed. The influence of the ground reinforcement effect on the underground structure was discussed using the Monte Carlo simulation, which considers the uncertainty of the soil properties in the evaluation of the probability of seismic failure.