Uncertainty quantification and propagation in the modeling of liquefiable sands

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This paper combines data from laboratory, centrifuge testing, and numerical tools to highlight the predictive capabilities of the Bayesian method for uncertainty quantification and propagation. The Bayesian approach is employed to estimate uncertain parameters of a multi-yield constitutive model using data from cyclic-triaxial testing. Then, predictive capabilities of a finite element model in reproducing the dynamic response of a saturated sand deposit are investigated by drawing samples from the estimated posterior probability distributions of the constitutive model parameters. Variability of the predicted responses due to estimation uncertainty is evaluated. The response of centrifuge tests is used to assess the simulated responses.