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Estimation of the Length and Location of Ground Surface Deformation Caused by the Reverse Faulting

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Abstract : Field observations have revealed many examples of structures which were damaged due to ground surface deformation caused by the faulting phenomena. In this paper some efforts were made in order to estimate the length and location of the ground surface where large displacements were created due to the reverse faulting. This research has conducted in two steps; (1) in the first step, a 2D explicit finite element model were developed using ABAQUS software. A subroutine for Mohr-Coulomb failure criterion with strain softening model was developed by the authors in order to properly model the stress strain behavior of the soil in the fault rapture zone. The results of the numerical analysis were verified with the results of available centrifuge experiments. Reasonable coincidence was found between the numerical and experimental data. (2) In the second step, the effects of the fault dip angle (δ), depth of soil layer (H), dilation and friction angle of sand (ψ and φ) and the amount of fault offset (d) on the soil surface displacement and fault rupture path were investigated. An artificial neural network-based model (ANN), as a powerful prediction tool, was developed to generate a general model for predicting faulting characteristics. A properly sized database was created to train and test network. It was found that the length and location of the zone of displaced ground surface can be accurately estimated using the proposed model.

Keywords : reverse faulting, surface deformation, numerical, neural network
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