FINITE ELEMENT AND MESHFREE ANALYSES OF SLOPE STABILITY PROBLEM USING AN ELASTOPLASTIC MODEL FOR GEOMATERIALS

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Performance of an elastoplastic constitutive model for geomaterials is evaluated in geomechanics problems involving pre-failure deformation and stability. The model is formulated for small strains and uses a non-associative flow rule along with nonlinear isotropic hardening/softening laws defining the evolution of its four internal variables, i.e. friction, dilatancy, cohesion, and tensile strength. Hence the cohesive-frictional nature of geomaterials and their potential tensile strength is accounted for. To asses the model performance in a boundary value problems, both conventional finite element method and a meshfree method based on Reproducing Kernel Particle Method are used. Numerical simulations of a slope stability problem in pre-failure and near-instability stages are presented, and advantages and disadvantages of each method are discussed.

Keywords: slope stability, elastoplasticity