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## Modeling Large Deformation Slope Failure Using The Smoothed Particle Hydrodynamics (SPH) Method

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The slope stability analyses using limit equilibrium method (LEM) and finite element method (FEM) are mostly concerned about the factor of safety (FS) value of the slope. LEM cannot predict the soil behaviour after failure, while FEM can only be used to measure the material deformation before failure. Currently the Smoothed Particle Hydrodynamics (SPH) method has begun to be used as an alternative to overcome excess distortion of the mesh in FEM analysis due to post-failure large deformations in slope stability analysis. In this study, the behaviour of soil materials will be modelled as particles using the SPH method with reference to the previous research. The Bingham fluid model is used as a viscoplastic model of the soil material, and the Drucker-Prager soil constitutive model is used to describe the elastic-plastic behaviour of the soil. This modelling algorithm uses the equivalent viscosity of the Bingham fluid model as the initial stress between particles, and it uses the Drucker-Prager criterion with the associated flow rule to describe particle displacement due to slope failure. The soil particles are modelled as cohesive soil with a slope angle to the horizontal axis so that they can be compared with previous studies. The failure pattern is expected to be able to show areas of particles that are not deformed and particles that have collapsed. The FS value of the slope is obtained by the strength reduction method which seeks a non-convergent solution of each reduction in soil strength parameters.

Keywords: Smoothed Particle Hydrodynamics (SPH); Slope Stability; Bingham Fluid Model; Drucker-Prager Model; Strength Reduction Method