

## The application of particle swarm optimization in slope stability analysis of homogeneous soil slopes

### Abstract :

This paper applies particle swarm optimization (PSO) to find the most possible failure surface in stability analysis of homogeneous soil slopes. The stability of slopes is an important issue on geotechnical engineering. This problem includes two general concepts, factor of safety (FOS) and the critical slip surface (CSS). The resultant ratio of dividing strengthens forces by driving forces is called FOS. The critical slip surface is defined as a failure surface with the minimum value of FOS among all candidates. Regarding to the vast number of trial slip surfaces and the non-linear nature of equation of FOS, a global optimization algorithm is needed to locate CSS. As an optimization technique, the original version of PSO with little improvements in initial parameters is used. With this aim in view, we developed a computer code to find CSS by particle swarm optimization. Moreover, a sensitivity analysis is conducted to find the optimum values of initial parameters of PSO. Finally the effectiveness and efficiency of PSO code is verified and compared with the benchmark examples from the literature. The results demonstrated the ability of PSO to find CSS with better outcomes than former methods.