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Modelling 3D rock slope with a single elliptic joint surface by a meshless method

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Summary

Meshless methods have shown advantages in dealing with problems of moving interfaces such as crack propagation in rock. In Tongji University, meshless methods, the meshless Shepard and least squares (MSLS) method and the element-free Galerkin (EFG) method have been applied to slope stability analysis, especially for rock slope stability governed by a number of dominating discontinuities. Previous studies have focused on 2D problems where a joint surface is modelled as a crack line [1]. In this paper, the EFG method is extended for analyzing 3D rock slope with a single planner elliptic joint. Due to the increasing complexity in geometric description of joint surface in 3D, level set functions are utilized to describe the curved joint front and to capture the joint propagation [2]. Preliminary testing results are presented showing the performance of the proposed method. Remaining issues to be addressed in further studies are discussed, namely, the use of level sets for intersecting joints and the construction of meshless approximation for cohesive zone ahead of joint front.