Finite element modelling of embankment stability

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SUMMARY

The new proposed modified displacement vectors method can be used to determine the most critical failure surface and the corresponding safety factor for the analysis of the embankment stability. By definition, a family of consistent curves based on modified deformation vectors will introduce a unique system which shows the probable failure surfaces. Local safety factors for each of the family of curves can be defined by the finite element method. Finally, the total safety factor can be determined by the average local safety factors. The safety factors for the family of probable failure surfaces have almost regular variations. Therefore, the minimum safety factor and its corresponding failure surface can be obtained after the determination of a few surfaces. The linear elastic and elastoplastic bounding surface models have been used in this paper for determining the soil behaviour by the finite element method. The comparison of the results shows that the elastoplastic model gives more satisfactory results than the elastic model. In order to verify the proposed method, the final results were compared with the results obtained by the classical modified Bishop and Janbu method and it has been proved that these two methods have shown good agreement.