

Numerical Simulation for Slope Stability Analysis and Prediction of Landslides in Bac Kan Province, Northeast Vietnam

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Abstract: Movements down slopes of soil and rock masses are significant appearance of sliding process. The possibilities of the movements can be assessed by various methods. Among that, limit equilibrium method is very common. In this method, the slip surface is assumed to be an arc or along the weakest surface defined in the field. In each case, a numerical model have been proposed to assess slope stability.

Bac Kan is a mountain province in the northeast of Vietnam where landslides are very popular, especially in rainy season. Along the road from Cho Moi to Cho Don, 72 big landslides were recorded. The volumes of landslides can exceed 5000 m³. The slip surfaces are either arc or along surfaces of oblique beddings. Remarkably, the biggest slides always have slip surfaces mixed between arc and oblique bedding. A new numerical solution linked 2 available models is proposed to assess slope stability in such case. Based on results of field measurements and numerical models, influences of geological structure, physio-mechanical properties of soils and rocks, topography, thickness of weathering crust and vegetable coverage have been clearly determined. From that a chart of slide prediction is proposed. The chart indicates 4 zones with different possibilities of sliding which are very high, high, medium and low possibility, respectively.

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