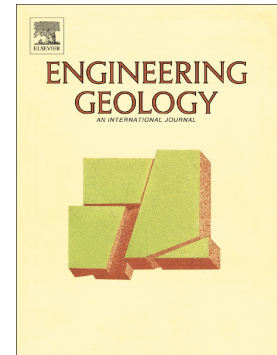


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## Effect of spatial variability of shear strength parameters on critical slip surfaces of slopes

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### **Abstract**

Critical slip surface (CSS) of slopes is useful information in system reliability analyses and risk assessments of slopes. This paper investigates the effect of spatial variability of shear strength parameters on the CSS distribution of a two-dimensional slope using a finite element stress-based slope stability method. The failure mechanics for typical CSSs in a heterogeneous slope are analyzed and distributions of CSS for various combinations of horizontal and vertical scales of fluctuation (SOFs) are evaluated. The results show that local failures may occur in statistically homogeneous slopes, which cannot be observed in deterministic slope stability analyses. The distribution range of CSS first increases and then decreases with an increasing scale of fluctuation. As the ratio of horizontal SOF to vertical SOF is large, local failures have entry points located at the top of a slope. By contrast, as the ratio of horizontal SOF to vertical SOF is relatively small, local failures have entry points located either at the top of a slope or on the slope

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