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# Comparison of the Factor of Safety and Strength Reduction Factor Values from Slope Stability Analysis of a Large Open Pit

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**Abstract :** The use of stability criteria within geotechnical engineering is the way the results of analyses are conveyed, and sensitivities and risk assessments are performed. Historically, the primary stability criteria for slope design has been the Factor of Safety (FOS) coming from a limit calculation. Increasingly, the value derived from Strength Reduction Factor (SRF) analysis is being used as the criteria for stability analysis. The purpose of this work was to study in detail the relationship between SRF values produced from a numerical modeling technique and the traditional FOS values produced from Limit Equilibrium (LEM) analyses. This study utilized a model of a 3000-foot-high slope with a 45-degree slope angle, assuming a perfectly plastic mohr-coulomb constitutive model with high cohesion and friction angle values typical of a large hard rock mine slope. A number of variables affecting the values of the SRF in a numerical analysis were tested, including zone size, in-situ stress, tensile strength, and dilation angle. This paper demonstrates that in most cases, SRF values are lower than the corresponding LEM FOS values. Modeled zone size has the greatest effect on the estimated SRF value, which can vary as much as 15% to the downside compared to FOS. For consistency when using SRF as a stability criteria, the authors suggest that numerical model zone sizes should not be constructed to be smaller than about 1% of the overall problem slope height and shouldn’t be greater than 2%. Future work could include investigations of the effect of anisotropic strength assumptions or advanced constitutive models.

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