Geophysical Research Abstracts, Vol. 8, 04555, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04555

On root reinforcement modelling

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Root reinforcement models are used to analyze published data from laboratory and in-situ shear tests and pullout tests on soils reinforced with synthetic materials and root systems. Analysis of stability was conducted referring to shallow landslides which occurred in Italy. Various modelling approaches are compared and the problems involved in gathering necessary data are taken into account. Understanding the failure mechanism allows one to identify appropriate application of the models to stability analysis. Adopted models can be useful in understanding soil-root behaviour and interpreting test results. This allows one to identify their requirements and limitations. In most cases, the tensile force may be well below the ultimate tension. Root reinforcement is often treated as an additional apparent cohesion at a potential slip surface and included in the resistance term of the calculation of the factor of safety; it is assumed that a slope will fail if the total available resistance has been mobilised to counteract the driving forces along any potential slip plane passing through the soil mass. In that case, the ratio of the maximum available shearing resistance over that required to prevent failure, the basic definition of the factor of safety F for slope stability problems, is at unity (F= 1 and F$>$ 1 if only part of the available resistance needs to be mobilised). The simple models can give approximate results if the tensile force can be evaluated. Overestimation of root cohesion could be corrected by a 0.4 factor. The analyses demonstrated the importance of root geometry, site conditions, and the nature of root displacement, which control the failure mechanism.