



Determination of basic friction angle using various laboratory tests.

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The basic friction angle of rock is an important factor of joint shear strength and is included within most shear strength criteria. It can be measured by direct shear test, triaxial compression test and tilt test. Tilt test is mostly used because it is the simplest method. However, basic friction angles measured using tilt test for same rock type or for one sample are widely distributed and often do not show normal distribution.

In this research, the basic friction angles for the Hangdeung granite from Korea and Berea sandstone from USA are measured accurately using direct shear test and triaxial compression test. Then basic friction angles are again measured using tilt tests with various conditions and are compared with those measured using direct shear test and triaxial compression test to determine the optimum condition of tilt test. Three types of sliding planes, such as planes cut by saw and planes polished by #100 and #600 grinding powders, are prepared. When planes are polished by #100 grinding powder, the basic friction angles measured using direct shear test and triaxial compression test are very consistent and show narrow ranges. However, basic friction angles show wide ranges when planes are cut by saw and are polished by #600 grinding powder. The basic friction angle measured using tilt test are very close to those measured using direct shear test and triaxial compression test when plane is polished by #100 grinding powder. When planes are cut by saw and are polished by #600 grinding powder, basic friction angles measured using tilt test are slightly different. This indicates that tilt test with plane polished by #100 grinding powder can yield an accurate basic friction angle. In addition, the accurate values are obtained not only when planes are polished again after 10 times of tilt test, but values are averaged by more 30 times of tests.