Brazilian test - a macroscopic point of view on tensile fracture generation

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ABSTRACT

Brazilian test is a popular indirect procedure of estimating the tensile strength of rocks in laboratory tests. The method has been intensively analysed experimentally and theoretically since it is simple for carrying out in laboratory and simultaneously it can be analysed by methods of continuum and fracture mechanics.

The tensile strength of solid materials is one of the most important parameter describing a behaviour of the material under external mechanical load and thus its knowledge is of great practical importance. However, the direct measurement of tensile strength especially for brittle materials is quite difficult and thus only limited results are available. To cope with this situation it have been proposed an indirect method of estimation of the tensile strength well know as the *Brazilian test*. The method relies on diametrically loading of disc-like sample of the brittle material until it splits apart due to a induced tensile stress.

In this paper we report our effort of describing the fracturing process during the Brazilian from the ``microscopic"point of view. For this purpose we use an advanced implementation of the Discrete Element Method the Esys-Particle software (Abe, Wang 2009) and represent rock spacemen as a set of spherical interacting spheres mimic grains of real rock material. We have found out that in a large range of particles size building our synthetic samples an observed maximum loading force which sample can withstand linearly scales up with a ratio of maximum-to-minimum particles diameters. An attempt of an estimation of the fracturing speed is also reported.

REFERENCES

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