



Brazilian test - a microscopic insight into stress-strain relation based upon numerical simulations

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The Brazilian test is a simple and cheap method of estimating tensile toughness of a rock sample in laboratory conditions. It gives a platform for investigating the relation between microscopic structure of rock and rock toughness using the numerical Discrete Element Method simulations. In this research numerically tested sample of rock is represented by a stochastic assembly of rigid particles (spheres). Rigidity here means that those elements cannot deform, but, in the same time, they can overlap, what creates repulsive forces between overlapping particles. During the numerical simulations of the Brazilian test the sample is subjected to an axial compression, what induce the tensile forces leading finally to splitting the sample apart in direction more or less perpendicular to the applied force. The analysis of the relationship between the maximum axial stress, which can withstand the sample, and microscopic composition (structure) of the sample is a matter of this presentation. We conclude that maximum axial force scales up with the ratio of maximum to minimum particle size almost linearly.