Simple method of rock pore structure determination presented with the most common rock types quarried in Slovakia

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Abstract

Porosity is a very important rock property because it controls many other rock properties. However, not only the total or open porosity but also the rock pore structure (RPS) is important because of its relation to some rock properties. The RPS includes characteristics such as the rock pore size and shape, pore size distribution, total and open porosity, active interior pore wall surface, and interconnectivity of pores. Not all the RPS characteristics are easy to identify and express numerically. Porosity is commonly tested in all commercial laboratories of rock mechanics, but the other RPS characteristics are tested in advanced scientific laboratories only, because their determination depends on expensive laboratory devices and highly skilled staff. In the paper we present the practical use of a very simple alternative method of determining RPS. The method is based on an assumption: if water sorption (adsorption and absorption) into rock pores is controlled by RPS, then water sorption under various controlled conditions can determine RPS. The RPS determination is demonstrated on rock samples, from 80 localities, of eight the most common rock types widely used in civil engineering practice in Slovakia. All the results are given as the percentage weight of water in rock pores of four different categories, which are defined by their size and accessibility to water. The results also reveal the average values and ranges of RPS for each tested rock type.