Strength and deformation properties of volcanic rocks in Iceland

Tunnelling work and preinvestigations for road traces require knowledge of the strength and deformation properties of the rock material involved. This paper presents results related to tunnelling for Icelandic water power plants and road tunnels from a number of regions in Iceland.

The volcanic rock from Iceland has been the topic for rock mechanical studies carried out by Icelandic guest students at the Department of Civil Engineering at the Technical University of Denmark over a number of years in cooperation with University of Iceland, Vegagerðin (The Icelandic Road Directorate) and Landsvirkjun (The National Power Company of Iceland). These projects involve engineering geological properties of volcanic rock in Iceland, rock mechanical testing and parameter evaluation. Upscaling to rock mass properties and modelling using Q- or GSI-methods have been studied by the students and are available in their MSc-theses, but will not be covered here.

The present contribution gives a short engineering geological overview of the volcanic rock formations in Iceland. Furthermore, the results of a number of unconfined, Brazilian, and a limited number of triaxial compression tests are presented and evaluated. The results are grouped according to engineering geological classification and classification properties such as bulk density. Correlations between the bulk density and the logarithm to the elasticity modulus and strength parameters are established and discussed.

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