



Analysis of fracture in a soft rock (Neapolitan Tuff) using digital image correlation with displacement discontinuity quantification

S. Hall, G. Viggiani

Laboratoire 3S-R, Grenoble, France (cino.viggiani@hmg.inpg.fr)

This paper considers the failure processes of the Neapolitan Fine-Grained Tuff (FGT) with the particular aim of gaining improved understanding of the mechanisms of rock failure by fracture coalescence. The results are of interest both for understanding the processes of *in situ* structural collapses and also, with the new experimental observations and quantification, for a more fundamental understanding of crack initiation, propagation and interaction. Results from an experimental program at Laboratoire 3S-R in Grenoble and associated analysis by digital image correlation (DIC) are presented. These results allow assessment of the mechanisms of crack initiation, propagation and interaction in samples (both intact and with pre-existing artificial flaws/cuts) of natural, dry specimens of the FGT. Combined analysis of photographic images and acoustic emission shows that the failure is controlled by the pre-existing discontinuities, that the cracking process depends on the number and geometry of flaws present and that a number of possible mechanisms can be involved, in particular for the processes acting within the rock bridges between the flaws. The focus of this paper is understanding and quantifying these phenomena and their controlling factors through analysis by DIC and in particular by means of a new method which permits analysis of discontinuities in displacement from the DIC results (DIC can usually be considered just as a continuum approach).