

Full-field deformation characteristics of anisotropic marble under compression revealed by 3D digital image correlation

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Abstract

This work aims to reveal the anisotropic full-field displacement and the progressive failure behaviors of interbedded marble under uniaxial compression using three dimensional digital image correlation (3D DIC) technique. The effects of the interbed orientation on the field displacement and strain pattern and the crack evolution were analyzed qualitatively and quantitatively. Testing results show that different stress strain responses can be generated depending on the interbed orientation, and the interbeds influence the localized deformation and high strain concentration pattern. The field displacement evolution curves present different pattern and are impacted by the localized deformation. In addition, the strain localization takes places progressively and develops at a lower rate for rock with 0° and 90° interbed than those of 30° and 60° interbed rock. The quick shear-sliding along the interbed leads to the minimum strength of rock having 30° interbed orientation. It is suggested that rock anisotropic field deformation is structure depended.

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