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Influence of Physical Properties on Estimation of Mechanical Strength of Limestone

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Abstract : Determination of the rock mechanical properties such as unconfined compressive strength UCS, Young's modulus E, and tensile strength by the Brazilian test Rtb is considered to be the most important component in drilling and mining engineering project. Research related to establishing correlation between strength and physical parameters of rocks has always been of interest to mining and reservoir engineering. For this, many rock blocks of limestone were collected from the quarry located in Meftah(Algeria), the cores were crafted in the laboratory using a core drill. This work examines the relationships between mechanical properties and some physical properties of limestone. Many empirical equations are established between UCS and physical properties of limestone (such as dry bulk density, velocity of P-waves, dynamic Young's modulus, alteration index, and total porosity). Others correlations UCS-tensile strength, dynamic Young's modulus-static Young's modulus have been find. Based on the Mohr-Coulomb failure criterion, we were able to establish mathematical relationships that will allow estimating the cohesion and internal friction angle from UCS and indirect tensile strength. Results from this study can be useful for mining industry for resolve range of geomechanical problems such as slope stability.

Keywords : limestone, mechanical strength, Young's modulus, porosity
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