Geotechnical Properties of the Rodessa Formation in East Texas: A Compressive and Tensile Strength Analysis Using Artificial Neural Network Methodology

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ABSTRACT

The estimation of rock mass strength is becoming more and more important because this is a key parameter in rock mechanics and geotechnics which are used in the design of geotechnical structures like tunnels, dams, and slopes. The main focus of this study is to calculate the shear strength of certain rocks and to correlate their stability when they are injected with fluids. The parameters which will be used are the unconfined (uniaxial) compression test (UCS) and tensile strength. In this study, a soft computing approach which is known as Artificial Neural Networks (ANN) will be used to predict the strength of rocks from the Rodessa Formation of the East Texas region. Core samples from the Rodessa Formation will be taken from the Stephen F. Austin State University Core Lab Repository and tested at the University of Texas at El Paso. Parameters such as water absorption, dry density, saturation density, and bulk density will be experimentally determined using procedures given by the International Society of Rock Mechanics . These procedures can predict the uniaxial compressive strength and tensile strength of the rocks from the Rodessa Formation. Based on previous studies, it is found out that artificial neural networks are quite accurate in providing the strength of the rocks. Therefore, results obtained will be useful in characterizing the rocks of the Rodessa Formation for practical applications.