

Article Temenuga & al.

1. [Tom 1 Nr 1 \(2024\): Inżynieria Mineralna /](#)

2. ARTYKUŁY

Prędkość ultradźwiękowa analizy wpływu zawartości wody na kredę fosfatyczną

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DOI: <https://doi.org/10.29227/IM-2024-01-07>

Słowa kluczowe: Prędkość ultradźwiękowa, Wpływ zawartości wody, Kreda fosforanowa, Prędkość ultradźwiękowej fali ściskającej, jednoosiowe ściskanie

Abstrakt

Water content may have a crucial effect on the petrophysical and mechanical properties of high porosity rocks such as chalk. Consequently, the water fluctuations may significantly influence the behaviour of engineering structures that are constructed in chalks. It is the aim of this study to illustrate how the elastic and strength properties of chalk can evolve considering water content variation using P-wave velocity and analytical analyses. To study the influence of water on the ultrasonic compressional wave velocity (VP), measurements of travel time of three samples subjected to different water content were performed. The Uniaxial Compressive Strength (UCS) in dry and saturated chalk specimens was also estimated. To clarify the possible influence of lithology on the physicommechanical properties of rocks, three samples of phosphatic chalk were studied in thin sections. Automated mineral analysis and textural imaging of

the samples were performed using an FEI QEMSCAN®. The analyses of the Ultrasonic tests reveal that changes in the water content are associated with variations in the P-wave velocity. Based on P-wave velocity changes as a function of water content, analytical models have been used to predict the elastic and strength properties. The data indicate that the presence of water significantly reduced the elastic and strength parameters of the chalk, a result that is in agreement with the UCS laboratory tests. The derived equations can be used for predicting the elastic and strength properties of high-porous chalk from the P-wave velocity as a function of water content. This approach may avoid the necessity for time-consuming laboratory testing.