

1. Basic Study on Estimation of Compressive Strength of the Ground Using Rod Stress Waves During Drilling

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In the construction of mountain tunnels, it is necessary to select an effective support pattern based on observation surveys at the tunnel face and displacement measurement after excavation. Observation surveys, the hammering of rock samples, point load strength tests, and rock Schmidt tests are performed to investigate the compressive strength of rock. In these tests, there are problems with measurement accuracy and safety. In this study, we focused on the fact that the amplitude of the stress wave propagating in the rod of a hydraulic rock drill varies, depending on the condition of the ground being drilled. We conducted drilling experiments on test blocks whose compressive strength was known. From the experiments, we found that among the stress waves propagating through the rod of the rock drill during drilling, the ratio of the maximum amplitudes of compressive and tensile stresses of the reflected wave was highly correlated with the compressive strength of the rock. This fact suggests that the positive and negative stress amplitude ratio is an effective index for estimating the compressive strength of the ground.

Key words: drilling survey, rod stress, stress amplitude ratio, compressive strength