

Numerical study on the propagation of longitudinal waves in GFRP rock bolt

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ABSTRACT

This study aims to investigate the propagation of longitudinal waves in GFRP rock bolts using numerical simulations. A two-dimensional axisymmetric model is utilized to represent the rock bolts. The simulations assess the influence of the grout and rock on the wave propagation, with a particular focus on how these materials influence the behavior of longitudinal waves. The study also examines how varying excitation frequencies affect the wave characteristics. Results show that the velocity of longitudinal waves increases with the elastic modulus of either grout or rock. However, changes in the elastic modulus of the grout have a slight effect on velocity. In contrast, changes in the elastic modulus of the rock significantly influence wave velocity. Moreover, the wave velocity in the rock bolt gradually decreases as the rock thickness increases, but this effect decreases as the excitation frequency increases.

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