

## Characterization of Ultrasonic Nonlinearity in Concrete under Cyclic Change of Prestressing Force

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**Abstract :** In this research, the effect of prestressing force on the nonlinearity of concrete was investigated by an experimental study. For the measurement of ultrasonic nonlinearity, a prestressed concrete beam was prepared and a nonlinear resonant ultrasound method was adopted. When the prestressing force changes, the stress state of the concrete inside the beam is affected, which leads to the occurrence of micro-cracks and changes in mechanical properties. Therefore, it is necessary to introduce nonlinear ultrasonic technology which sensitively reflects microstructural changes. Repetitive prestressing load history, including maximum levels of 45%, 60% and 75%, depending on the compressive strength, is designed to evaluate the impact of loading levels on the nonlinearity. With the experimental results, the possibility of ultrasonic nonlinearity as a trial indicator of stress was evaluated.

**Keywords :** micro crack, nonlinear ultrasonic resonant spectroscopy, prestressed concrete beam, prestressing force, ultrasonic nonlinearity

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