

Tensile Load Measurement of a 7-wire Strand for the Health Monitoring of the Cable Assisted Structure

Seung Hyun Cho¹, Jae-Ha Park², Bonggyu Ji³

¹Center for Safety Measurement, Korea Research Institute of Standards and Science, Republic of Korea,

¹Center for Safety Measurement, Korea University of Science and Technology, Republic of Korea,

¹Measurement Science, Korea Research Institute of Standard and Science, Republic of Korea

The main objective of this study is to include measuring tensile forces using frequency spectrum of guided wave in the 7-wire strands which are widely used in various types of prestressed structures. Also, it is important to measure tensile forces in the 7-wire strand for the health and safety of prestressed structures such as bridges, slope anchors, and PSC (Prestressed Concrete). In this study, we propose a method for measuring tensile forces by observing the variation in the frequency spectrum of guided wave in the 7-wire strand under axial load. The tensile forces can be estimated by measuring the variation of the frequency spectrum of the guided wave. Electromagnetic acoustic transducers(EMAT) are used for generating and detecting guided waves propagating in the axial direction of the 7-wire strand. The contactless aspect of the EMAT leads to high reproducibility and repeatability by eliminating error sources associated with the use of contacting piezoelectric transducers and also allows a much easier and quicker tensile forces evaluation. The detected signal was processed through signal processing, and its frequency spectrum is obtained for tensile forces evaluation. Finally, the frequency spectrum detection system of the 7-wire strand has been established. The results show promising feasibility on the measurement of tensile forces in the 7-wire strand.