THE RELATIONSHIP BETWEEN THE APPLIED TORQUE AND STRESSES IN POST-TENSION STRUCTURES

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Abstract

This paper presents the non-destructive testing (NDT) method to determine the resultant stresses in mild steel bar usually employed in structures. The technique utilized ultrasonic pulse-echo that determined the wave velocity change due to torque applied between bolt and nut. Mild steel bar with nominal diameter of 19 and 25mm were used. The specimen was loaded by means of a torque wrench that gave the required amount of moment (~300Nm). This was carefully achieved manually. In order to measure the strain, strain gauges were employed. The direct strain gauge method gives the strain values. This strain is used to calculate the stress due to the applied load. The experiment had been carried out in a control environment with constant temperature. The relationship between torque-velocity, torque-strain and stress-strain is obtained and compared. The test results indicate that ultrasonic wave velocity decrease with the applied torque. This is due to degradation or loss of strength of the material. The potential of this NDT method to obtain structure quality and strength determination is discussed.

Keywords: Torque, Stress, Ultrasonic pulse-echo, Ultrasonic wave velocity.

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