

Theoretical Approach for Estimating Transfer Length of Prestressing Strand in Pretensioned Concrete Members

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Abstract : In pretensioned concrete members, the transfer length region is existed, in which the stress in prestressing strand is developed due to the bond mechanism with surrounding concrete. The stress of strands in the transfer length zone is smaller than that in the strain plateau zone, so-called effective prestress, therefore the web-shear strength in transfer length region is smaller than that in the strain plateau zone. Although the transfer length is main key factor in the shear design, a few analytical researches have been conducted to investigate the transfer length. Therefore, in this study, a theoretical approach was used to estimate the transfer length. The bond stress developed between the strands and the surrounding concrete was quantitatively calculated by using the Thick-Walled Cylinder Model (TWCM), based on this, the transfer length of strands was calculated. To verify the proposed model, a total of 209 test results were collected from the previous studies. Consequently, the analysis results showed that the main influencing factors on the transfer length are the compressive strength of concrete, the cover thickness of concrete, the diameter of prestressing strand, and the magnitude of initial prestress. In addition, the proposed model predicted the transfer length of collected test specimens with high accuracy. Acknowledgement: This research was supported by a grant(17TBIP-C125047-01) from Technology Business Innovation Program funded by Ministry of Land, Infrastructure and Transport of Korean government.

Keywords : bond, Hoyer effect, prestressed concrete, prestressing strand, transfer length

Conference Title : ICAEI 2017 : International Conference on Architectural Engineering and Infrastructure

Conference Location : Bangkok, Thailand

Conference Dates : October 26-27, 2017