Effective Moment of Inertia of Single Spanned Reinforced Concrete Beams with Fixed Beam-Column Joints.

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Abstract
Of prime importance in the determination of the deflection of beams is the calculation of the moment of inertia (I) of the beam, the value of which changes along the span length from "I_g " for uncracked sections to "I_cr " for cracked sections. From literature, many experimental works have been carried out on simply supported beams with varying concrete characteristic strengths and percentages of reinforcement. However, none was on beam with fully or partially restrained ends. Hence the focus of this research work is to determine the effective moment of inertia (I_e ) of a cracked L-section of reinforced concrete beam with full end restrained. Three existing models for determining "I_e " were used in the estimation of the deflection of the beam, and these existing models were modified in order to get a proposed model that gives a more accurate prediction of the deflection. At service load of 9.81 kN/m, the estimated deflections using the values of I_e from the existing three models and the proposed model were 2.01 mm, 9.81 mm, 2.68 mm and 8.37 mm respectively, while the actual deflection was 8.14 mm. From these results, the proposed model predicts more accurately the deflection of the L-beam than the three existing models, however, it is recommended that further research should still be carried out on reinforced concrete beams with fixed beam-column joints, in order to get a model that can predict more accurately, the effective moment of inertia "I_e " for other types of beams such as rectangular and T-beams.

Keywords: Deflection, Uncracked Moment of Inertia; Cracked Moment of Inertia; Effective Moment of Inertia; Cracking Moment; Elastic Modulus of Concrete.