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Flexural Behaviour of Pre-stressed Concrete Beam- A Numerical Study

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Abstract

Prestressed concrete beams are used as primary load-carrying members in precast frame structures as well as in bridges. The prestressed concrete is designed to resist the development of cracks and improve deflection control. In the present study, a numerical analysis was carried out using ABAQUS software on prestressed concrete beam. The beam had an external cross-sectional dimension of $200\text{mm} \times 300\text{mm}$ and a total length of 1600mm . M50 grade concrete was used, along with three prestressed strands of 12.7mm diameter on the tension side. The beam was also reinforced with $2\text{-}16\text{mm}$ diameter reinforcement in the compression face and $2\text{-}12\text{mm}$ diameter reinforcement in the tension face, with a clear cover of 30mm . The beam was provided with 8mm diameter stirrups 150mm c/c spacing as transverse reinforcement. Comparisons between the numerical and experimental results in terms of cracking load, ultimate load & corresponding displacement, and failure mechanisms are presented.

KEYWORDS: Pre-stressed concrete beam, Flexural Strength, Finite Element, Prestressed strands.

CATEGORY: Structural engineering.