

CURVED STRUCTURE ANALYSIS FOR TYPICAL LOADING WITH RESTRAINED BOUNDARY CONDITION, USING ISOPARAMETRIC BEAM ELEMENT

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ABSTRACT

Analysis of curved structures for different loading patterns and boundary conditions creates complications due to inter-action of in-plane and bending stresses. Due to the availability of fast-running computers, all the complicated structures were now easily analyzed using the Finite Element Method. This paper deals with such types of complicated structures as the Helical staircase, which was not only curved in the plan but also curved in elevation too. Analysis of helical staircase with 90° helix angle, 3.6m floor height, and 200mm waist-slab thickness, was carried out for both the restrained support conditions, along with four types of loading pattern. Types of loading were: UDL over entire length; UDL over bottom half-length; UDL over top half-length; Point load at quarter lengths. Using the Finite Element Method Semi-loof beam element was used to analyze the selected staircase. The total staircase was discretized in six equal elements, through 13 nodal points with in-all 72 d.o.f. Results thus obtained for inplane & bending stresses as well as displacements; were plotted and shown in a tubular form also.

KEYWORDS: *Boundary Condition - Displacement - Force Resultant, Helix – Isoparametric & Semilo of Beam*

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