Nonlinear Finite Element Analysis of Composite Cantilever Beam with External Prestressing

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Abstract : This paper deals with a nonlinear finite element analysis to examine the behavior up to failure of cantilever composite steel-concrete beams which are prestressed externally. 'Pre-' means stressing the high strength external tendons in the steel beam section before the concrete slab is added. The composite beam contains a concrete slab which is connected together with steel I-beam by means of perfect shear connectors between the concrete slab and the steel beam which is subjected to static loading. A finite element analysis will be done to study the effects of external prestressed tendons on the composite steel-concrete beams by locating the tendons in different locations (profiles). ANSYS version 12.1 computer program is being used to analyze the represented three-dimensional model of the cantilever composite beam. This model gives all these outputs, mainly load-displacement behavior of the cantilever end and in the middle span of the simple support part.

Keywords : composite steel-concrete beams, external prestressing, finite element analysis, ANSYS
Conference Title : ICCEAM 2017 : International Conference on Civil Engineering and Applied Mechanics
Conference Location : Rome, Italy
Conference Dates : March 05-06, 2017