NONLINEAR ANALYSIS OF HYBRID STEEL-CONCRETE BEAM WITH INTERLAYER SLIPS

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This paper presents a finite element formulation based on co-rotational method for the analysis of composite steel-concrete beam with more than one fully encased steel profile, so-called hybrid beam. The advantage of using the co-rotational approach is that the geometrical linear finite element formulations can be reused and automatically be transformed into geometrical nonlinear formulations. In the present work, the exact stiffness matrix derived from the analytical solution of the governing equations for hybrid beam with interlayer slip is used for local formulations. As a result, the internal nodes to avoid shear and curvature locking encountered in low order polynomial finite elements are not required. Finally, several numerical applications are presented in order to assess the performance of the proposed formulation.