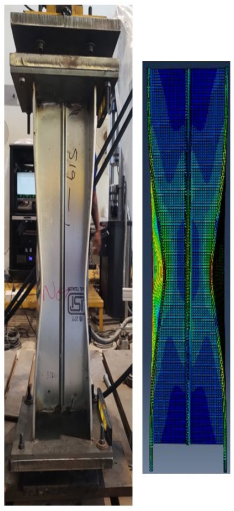
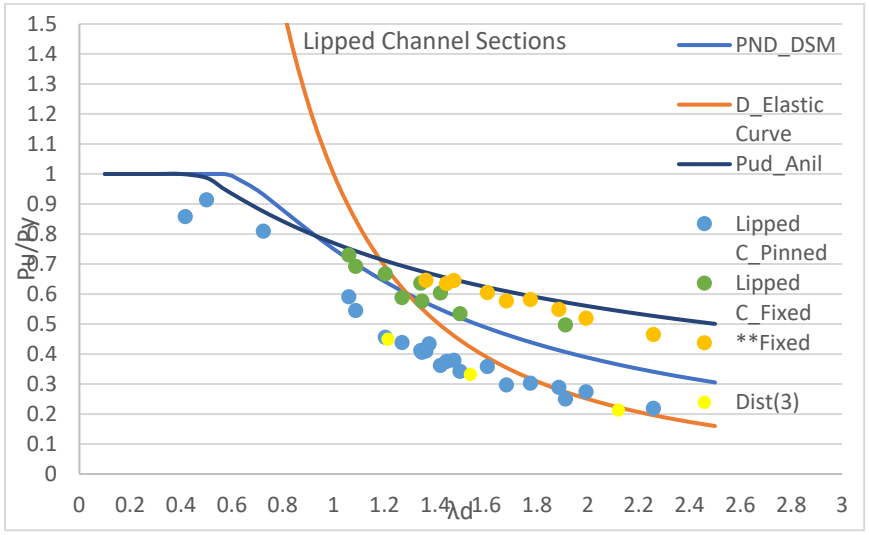
Development of DSM based design rules for cold-formed steel columns undergoing shift

Graphical Abstract/ Layout





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Project Description:

One of the major limitations of direct strength method (DSM) of design in cold-formed steel (CFS) sections and its modification is that both local and distortional buckling strength equations were developed based on test or finite element analysis (FEA) results for compression members with fixed-end boundary conditions.

A systematic study is planned with the objectives (i) To study the effect of the shift of centroid on the behaviour and strength of CFS compression members undergoing different buckling modes (local, distortional, and global) and to develop DSM-based design procedure and (ii) To study the beam-column sub-assemblage to see the effect of partial rotational restraint on the ultimate strength of CFS compression members and to explore the possibility of a unified DSM procedure irrespective of support conditions.

At present the effect of shift of effective centroid due to distortional buckling on the behaviour and strength of CFS column is being studied through experiments and numerical simulations.

Products/ Instruments/ Results/ Outreach Activities (Pictures)

This detailed investigation on pinned-ended column sections failing after independent buckling modes (local, distortional, and global) by considering the effects of cross-sectional dimensions and non-dimensional slenderness ratio will enable to develop DSM based design column strength curves for columns having different end conditions other than fixed ones.

Through accomplishment of the set objectives, a novel design method based on the exsisting DSM will be proposed for the design of CFS columns with better accuracy. This will be a great guidance for the designers and research community in the domain of cold-formed steel structures.

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Department of Science and Technology (DST)

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Sanctioned Amount (in Rupees)
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Duration of the Project (years)
3