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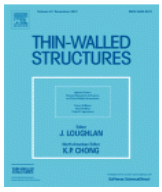

A constrained finite strip method for prismatic members with branches and/or closed parts

- N. Djafour,
- M. Djafour
- A. Megnounif,
- M. Matallah,
- D. Zendagui

- RISAM, Department of Civil Engineering, University of Tlemcen, B.P. 119, Tlemcen 13000, Algeria

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Abstract

The decomposition of buckling modes of thin-walled members subjected to axial stresses is a topic of great practical interest which can be achieved using the generalised beam theory (GBT) or the constrained finite strip method (cFSM). However, the latter is not general enough to study prismatic members with arbitrary cross-sections and the objective of this paper is to extend the cFSM to allow the buckling modes decomposition for prismatic members with branches and/or closed parts. To define the combined *GD* buckling mode, two

assumptions are used: (i) cylindrical plate bending and (ii) negligible in-plane transverse/shear strains. The corresponding constraint matrix, $\mathbf{R}_{\mathbf{GD}}$, is derived in a simple and general way. The methodology used to separate the global and distortional modes is similar to that used in the original cFSM while the derivation of the constraint matrix for local modes remains identical. Some examples are considered and the pure buckling curves are compared to the conventional FSM results. The conclusion is that the new cFSM has successfully computed the *GD* and the *L* modes of these sections.

Highlights

► cFSM extended to allow buckling modes decomposition for general prismatic members ► To define the combined GD buckling mode, only two assumptions are used. ► In GD mode: cylindrical plate bending; negligible in-plane transverse/shear strains. ► The corresponding constraint matrix is derived. ► The new cFSM has successfully computed the pure modes of general prismatic members.

Keywords

- Elastic buckling;
- Thin-walled member;
- Modal decomposition;
- Constrained finite strip method