A semi-discretized thin-walled beam element including distortion

An advanced thin-walled beam element including distortion of the cross section is presented. The formulation is based on a generalization of the classical Vlasov beam theory for analysis of open and closed thin-walled cross sections by including distortional displacements. The beam element formulation utilizes a semidiscretization approach in which the cross section is discretized into wall elements and the analytical solutions of the related GBT beam equations are used as displacement functions in the axial direction. Thus the beam element contains the semi-analytical solutions. In a number of related publications the authors have recently presented the semi-discretization approach and the analytical solution of the generalized beam equations. An illustrative example showing the validity and the accuracy of the developed distortional semi-discretized thin-walled beam element is given and it is shown how the novel approach provides accurate results making it a good alternative to the traditional and time consuming FE calculations.

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