A higher-order torsional beam theory

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SUMMARY

The effective parameters of torsional and warping stiffness, the effective polar mass moment of inertia and the mass bimoment due to warping for the thin-walled girders are formulated. This formulation is based on the energy equivalence in the governing formulae for natural frequencies of a thin-walled girder and its beam idealization assuming harmonic modes. For illustration, torsional vibrations of a square tube, a plate strip and a channel girder are considered. The results are checked by 3D FEM analysis for different boundary conditions.