

ICES 2024

TITLE OF PROJECT:

Comparative Flexural Behavior of Steel Girders with Flat versus Trapezoidal and Sinusoidal Corrugated Webs

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ABSTRACT (150-300 words):

Corrugated web girders (CWGs) offer structural advantages compared to flat-web girders for out-of-plane buckling, shear, torsion, and patch loading. This study focused on the flexural behavior of steel I-girders with flat and corrugated webs. Two corrugation profile variations, (1) trapezoidal and (2) sinusoidal webs were used in the CWGs. Detailed numerical models with nonlinear geometry and material behaviors were developed using the finite element method and were calibrated against documented test results from the literature. The numerical modeling framework is discussed in detail including automation by transforming solid models into finite element models, and determination of internal force results at the girder cross-sections using element-level stresses. A detailed comparison is provided in the flexural moment-curvature characteristics of CWGs versus flat-web girders. Further, the influence of key corrugation profile parameters was studied on the flexural behavior of CWGs. Results provide the comparative advantages of CWGs over flat-web girders for applications governed by out-of-plane buckling, shear, and torsion. Comparative advantages of CWGs are discussed in skewed steel-girder bridges.

KEYWORDS: Steel I-girders; flat-web; corrugated profiles; trapezoidal web; sinusoidal web.

CATEGORY: Structural Engineering