

Shear Buckling of a Large Pultruded Composite I-Section under Asymmetric Loading

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Abstract : An experimental and analytical research on shear buckling of a comparably large polymer composite I-section is presented. It is known that shear buckling load of a large span composite beam is difficult to determine experimentally. In order to sensitively detect shear buckling of the tested I-section, twenty strain rosettes and eight displacement sensors were applied and attached on the web and flange surfaces. The tested specimen was a pultruded composite beam made of vinylester resin, E-glass, carbon fibers and micro-fillers. Various coupon tests were performed before the shear buckling test to obtain fundamental material properties of the I-section. An asymmetric four-point bending loading scheme was utilized for the shear test. The loading scheme resulted a high shear and almost zeros moment condition at the center of the web panel. The shear buckling load was successfully determined after analyzing the obtained test data from strain rosettes and displacement sensors. An analytical approach was also performed to verify the experimental results and to support the discussed experimental program.

Keywords : strain sensor, displacement sensor, shear buckling, polymer composite I-section, asymmetric loading

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