

FRP strengthening of web panels of steel plate girders against shear buckling Part-I: Static series of tests

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Abstract

The result of an experimental programme investigating a novel technique to strengthen web plates against breathing fatigue is presented in this paper; the programme was divided into five phases, including: (1) the development of a novel preformed corrugated FRP panel for strengthening thin-walled steel plate girder webs against buckling, (2) selecting the adequate adhesive and epoxy using double-lap shear and tension specimens, (3) producing the FRP panel, and (4, 5) testing its performance in two main experimental series; the initial (static) series and the final (cyclic) series. Only the initial series which involved tests on 13 steel plates strengthened with the proposed preformed corrugated FRP panel and subjected to in-plane shear will be reported in this paper. This series investigated the performance of different forms of strengthening under static load, in preparation for a subsequent series of cyclic tests to investigate their fatigue performance. Test results showed the efficiency of the technique at increasing the stiffness of the strengthened specimens in comparison to the unstrengthened ones and reducing the critical stresses which will serve as a precursor for the anticipated increase in the fatigue life of the girders