

A new design method for a novel FRP strengthening technique against shear buckling of steel plate girders

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Abstract

This paper presents the theoretical part of an experimental study aimed for proposing a novel FRP strengthening technique to strengthen the webs of steel plate girders against breathing fatigue reducing the critical stresses and consequently increasing the life expectancy of the bridge. The proposed technique is economic, easy to install and is also designed for increasing the ultimate capacity of the strengthened specimens by up to 88% while maintaining the typical ductile shear failure of the steel plate girders, which is something not common with other strengthening techniques. A non-linear finite element model is developed and an extensive parametric study has been performed to propose a new design method for shear buckling of the new composite section including a simplified approach to determine the orthotropic mechanical properties of the proposed FRP section.