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A parametric study of the vehicle dynamic lateral load transfer of slab-on-girder composite bridge superstructures

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Abstract

The font to this section is (Times New Roman 11pt). This paper presents the effect of some geometrical parameters on traffic-induced lateral load transfer in simply-supported slab-on-girder bridges using the dynamic analysis. The studied parameters included cross frame spacing, girder spacing (number of girders), and slab thickness. The position of the lines of action of the moving load with respect to the superstructure width do not change, while the above mentioned parameters are varied in order to investigate their effects on the dynamic response of the bridge. The results have been presented in terms of the lateral load distribution factor, Df, of girders and mid-span deflection of exterior girders. The analysis results that the girder spacing and the slab thickness are influential on the lateral load transfer capability of the bridge. As far as the mid-span deflections of the two exterior girders are concerned, the slab thickness exhibits a more pronounced effect on the differential and absolute values of the deflections.

Key words: lateral behavior, slab-on-girder bridges, cross frames spacing, girders spacing, slab thickness, lateral load distribution factor, deflection.

1. Introduction

Composite slab-on-girder bridges are simplest and the most common type of short-to-medium span bridges [1], and are economical since their self-weight is not significant compared with the vehicle load [2]. Generally, composite action is recommended to enhance the stiffness and economy of structures [3]. The steel girder bridges are readily adopted to different terrain and alignment and can be erected in a relatively short time with minimum interruption of traffic