



Analytical Study on Tubular Flange Girder Bridges Using High Strength Steel

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Abstract

Twin-I girder bridge systems are representative structures used in bridge industrialization construction. They have advantages including structure simplification, material save and accelerated construction, but the system using two main girders limits the span and makes the lateral effect more significantly. The general suitable spans range from 25m to 45m, which limits the use of twin-girder bridges. To increase the span limit, the use of tube as top flange and high strength steel can improve structure behavior and increase bridge spans. In the paper, parametrical study and structure optimization were conducted to investigate the behavior of tubular flange girder bridges using high strength steel. Parameters including cross-beam arrangement, stiffeners, tube size were studied. Comparisons between the systems using ordinary steel and that using high strength steel were conducted.

Keywords: high strength steel; tubular flange girder; span limit; lateral torsion bulking; stability.

1 Introduction

Nowadays, the industrialized operation mode has gradually penetrated into bridge construction. Since 2016, China's Ministry of Transportation has been vigorously promoting the industrialized construction of highway steel bridges (including steel truss girders, steel box girders, and Steel-concrete composite girder bridges) to promote the construction of highway bridges and to make full use of the performance advantages unique to steel bridges. The industrialized construction of bridge structures requires simple cross-section, uniform segments and simplified lateral connection (crossbeams). For the twin-I girder bridges that are

used for industrialized construction, currently I section is mostly adopted, which is convenient for industrialized construction but has some problems meanwhile[1]. Firstly, in order to improve the stability and torsional resistance, a large number of crossbeams need to be arranged between the main girders, which increases construction time and cost. Secondly, the main girders made of ordinary steel are heavy, which has more requirements for construction equipment. Finally, the span of twin-I girder bridges is up to 40 m, which is not suitable for longer span bridges. Therefore, based on the demand of industrialized bridge construction, a tubular flange girder using high-strength steel is