



Application of Prestressed Concrete Composite Box-girder Bridges with Corrugated Steel Webs in Bridge Engineering in China

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Abstract

This paper presents the efforts made to promote the application of one of the environment-friendly bridge structures, namely prestressed concrete composite box-girder bridges with corrugated steel webs in China to reduce the concrete consumption and carbon dioxide emission. The development characteristics and problems on which further studies would be needed with respect to this type of bridge structure in China are discussed.

Prestressed concrete composite box-girder bridges with corrugated steel webs were introduced in China in the early 21st century. Now the number of this type of bridges under construction and completed has been more than forty, and China has become the second country where this type of bridges is most widely applied in bridge engineering in the world.

Keywords: bridge engineering; constructability; economic efficiency; corrugated steel webs; composite bridges

1 Introduction

According to 2003 statistics, the concrete consumption of China has amounted to 2.4 billion cubic meters, accounting for 40%~60% of concrete consumption of the world. The acquisition of huge amounts of sand, stone and cement is at the cost of the ecological environment destruction. So it is a pressing task to propel the application of advantageous bridge structures to reduce the concrete consumption. Propelling the applications of steel structure and composite structure is effective measures of energy saving and discharge reduction. China has kept the first place in reference to the steel output in the world in recent years, which provides condition for the large scale

application of the steel and composite structure. Composite bridges have found increased applications in bridge construction in Europe and America. According to statistics, the ratio of composite bridges is 85% in various bridge structures in France, it is 50% and 30% in Japan and America respectively, but it is less than 1% in China. Prestressed concrete composite box-girder bridge with corrugated steel webs is a new type of composite bridge structure, which includes corrugated steel webs, internal and external prestressed cables and shear connectors that connect the corrugated steel webs and the concrete flange slabs. According to estimation, this type of structure can reduce the concrete volume of bridge superstructure up to 20%.