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Fire of steel and composite beam bridges

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1 Abstract

The problem of bridge fires is growing. Because of a bad experience in Poland, it was decided to improve fire resistance of long span bridge structures, and of cable-stayed bridges in particular. Statistics shows that fire is a real threat to this kind of structure. They also confirm that the worst results of fire are for those with an orthotropic deck rather than with a concrete one. The basic problems to solve are how to predict fire resistance of a particular bridge and how to ensure safety and structural integrity of the bridge structure. Taking into account the fact that bridge standards do not include information relating to fire protection, and fire standards do not determine rules for design, construction and maintenance of such structures, there are no regulations for this problem. Fire scenarios are devoted to buildings, but the thermo-structural behavior of bridges is different.

Keywords: steel beam bridge; composite bridge; fire; thermal effects.

2 Introduction

Statistics show that bridge fires are a real threat, especially to plate girder bridges [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11]. It is also confirmed that the worst results of fire are for those with an orthotropic deck rather than with a concrete one. Unfortunately, the number of collapses of such bridges is growing. The basic problems to solve are how to predict fire resistance of a particular bridge and how to ensure safety and structural integrity of the bridge structure.

There are not regulations relating to this problem. Existing standards, like Eurocodes do not propose any regulation, and fire scenarios are devoted to fire of buildings, but the thermo-structural behavior of bridge structures is different than buildings.

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