Lateral torsional buckling of steel-concrete composite bridge I-girders

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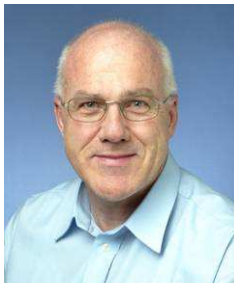

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Summary

I-girders of steel concrete composite bridges should be verified against Lateral Torsional Buckling (LTB) under traffic loads next to the intermediate supports. This paper introduces to the different methods of Eurocode 3 part 2 (steel bridges) to verify LTB and applies them to an example of typical twin-girder bridge. It shows that Eurocode 3 is very severe in comparison to the previous European National Standards and in comparison to a second order linear elastic analysis. The main reason of this conservative aspect is the use of the European buckling curve d.

Keywords: lateral torsional buckling (LTB); bridge design; Eurocodes; second order analysis; residual stresses; imperfections; transverse elements.

1. Introduction and objectives

I-girder of steel concrete composite bridges should be verified against Lateral Torsional Buckling (LTB). The LTB verification has to be carried out during the construction phases (launching, crane lifting or slab concreting) and for continuous girders, during the service life under traffic loads. This paper is limited to this latter case. Its main objectives are to explain how to apply the rules of the new European standard EN1993-2 [1] to verify the LTB of a girder bridge, and to explain why these new rules are very conservative.

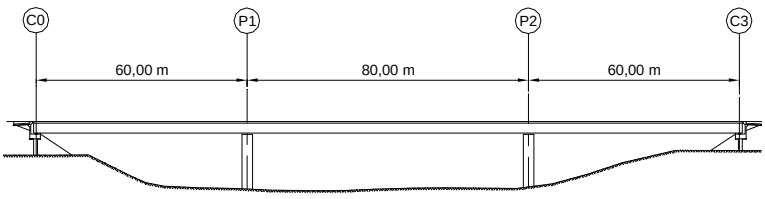

Fig. 1 *Longitudinal profile of the studied bridge*

The twin girder bridge used as an example in this paper is a symmetric three span bridge with cross beams (see Fig. 1 and Fig. 2). The cross beams are IPE600 which are equally spaced by a = 7.5 m in the side spans and a = 8 m in the central span. This type of design has been very common in France and other European countries for more than thirty years.

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