ABSTRACT

This paper describes the track-bridge interaction phenomenon in bridges for high speed railways, proposing a methodology for the structural analysis of the substructure taking into account the following aspects:

- Horizontal loads and imposed displacements due to the long-term behaviour of concrete and temperature using a step by step analysis and, if required, the construction process.
- Behaviour of ballast using non-linear links between the track and the superstructure,
- Behaviour of POT bearings,
- Interaction between foundation and ground conditions.

The methodology fulfils the specifications of Eurocode 1 and consist of modelling the whole structure (track-bridge) with a 2D or 3D model using linear bar elements and non-linear springs and the analysis of the different short-time and long-time scenarios.

To illustrate the methodology, three case studies of concrete viaducts of the HSR line Madrid-Barcelona-French Border are presented. The results are compared with those obtained from the simplified design methods.

KEYWORDS: RAILWAY BRIDGES, SUBSTRUCTURE, TRACK-BRIDGE INTERACTION