MODELLING OF VIBRATIONS INDUCED BY TRAFFIC IN TUNNELS: FROM THE SOURCE TO THE RECEIVER

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The simulation and study of problems related with vibrations induced by railway traffic in tunnels is a difficult and complex task. Actually, the complexity of the problem can be attributed to the vast field of analysis, which comprises not only the generation of vibrations inside the tunnel as well as its propagation through the ground and its interaction with existing buildings in surroundings. In the present paper a numerical procedure is presented in order to allow an efficient simulation of the vibrations induced by traffic from the source to the receiver (building). The numerical model is divided into three distinct parts, comprising the simulation of rolling stock, the simulation of the tunnel-ground system and the simulation of the building. The solution is obtained by a compliance formulation between the three sub-systems, developed in the frequency-(wavenumber) domain. Regarding the simulation of the tunnel-ground system, which deals with unbounded domain problem, an efficient solution is developed using a 2.5D technique based on the finite elements method, and adopting perfect matched layers (PML’s) for the treatment of the boundaries due to the truncation of the finite elements mesh.

The numerical model, which was previously validated [1, 2], is used for the developing of parametric studies where the influence of some parameters of the tunnel-ground system in the vibrations induced inside buildings or at the free field are analyzed and discussed.

REFERENCES