

## SHORT AND LONG TERM BEHAVIOUR OF RAILWAY TRANSITION ZONES

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### ABSTRACT

The railway experience in conventional and high speed lines shows that when track characteristics change abruptly as is the case, for example, of transitions from embankment to structures, such as bridges, culverts or tunnels or railway switches, the degradation of the track is considerably faster. These zones require frequent maintenance operations to restore the geometrical quality of the track.

In-situ continuous measurement of vertical track stiffness with appropriate vehicles [1, 2], showed that stiffness variations as high as two times can occur at embankment-bridge transition zones. Studies developed by the European Rail Research Institute [3] concluded that transition zones, especially embankment to bridge or culvert transitions, need special attention in terms of inspection, maintenance and renewal works. In comparison to normal track, maintenance frequency at transition zones may be up to five times higher and the costs about two times higher.

In order to smooth the stiffness variations at transitions zones, special solutions have been proposed. The most common solution adopted on high speed railway lines consists on a technical block placed between the embankment and the structure. Other solutions as, for example, the incorporation of under sleeper pads can be used to control the stiffness on transition zones [4-6]. The stabilisation and reinforcement of ballasted railway tracks using materials as polyurethane polymers [7] is a possible solution to prevent ballast settlements and the consequent track misalignment.

Infrastructure managers [3, 8] and researchers have been dedicating their attention to the understanding of the dynamic behaviour of train-track system at track transitions through the development of simulation studies [9].

Numerical models are powerful tools that enable the simulation of dynamic behaviour of transition zones [10-12]. The simulation is very important not only to evaluate the performance of the transition zone solution but also to anticipate problems. In this field the simulation of the long term behaviour of the transition is a challenge that has been calling the attention of several researchers.

The aim of this Minisymposium is to get together all the researchers that are dedicating their works to understand the behaviour of transition zones and the performance of mitigation measures. In this Minisymposium the researchers can present the models and methodologies

used to simulate either the short or the long term behaviour of these special zones where stiffness variations occur. The presentation of different studies, results and conclusions will prompt the discussion and the evolution of the subject.

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