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Effect of coupling vertical and lateral forces on the behaviour of High-speed railway track slabs

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Abstract. Railway infrastructure represents an intricate system characterised by complex loading which often results in complicated structural behaviour. Often the forces which act on the track are large, sudden and vary rapidly. This is also true on slab track where in addition to the normal vertical train loading, the slab track and other railway track components have to also resist horizontal forces. The horizontal forces can act parallel to the track, i.e. as a result of train accelaration and braking; and lateral or transverse to the the track, i.e. as a result of centrifugal forces on curves, cross winds, etc. This paper highlights a parametric study which has been conducted using finite element analysis software, namely Strand7, to investigate the effects of coupling vertical and horizontal lateral forces on the slab track on highspeed railway tracks. Two cases of lateral load application have been investigated. The first case is when lateral forces are applied equally on both rails (symmetric) and the second case is when when the lateral force is applied on only a single rail (unsymmetric). The outcome of this study will potentially lead to a better understanding and hence design of slab track subjected to different complex loading conditions in highspeed railway tracks.

Keywords: coupling forces; vertical; lateral; highspeed rail; track slabs

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