

GROUND-BORNE VIBRATION FROM TRAINS – A THREE DIMENSIONAL LAYERED GROUND MODEL

The report describes the theoretical background to a new mathematical model, which incorporates a two-dimensional track on a three-dimensional layered ground. The model calculates the transfer receptance from the railhead to an observation point on the ground at a distance from the track.

The model includes the effects of soil layer within the ground by means of a Finite Element type of approximation. Two orders of element have been produced. These allow for linear and cubic polynomial approximation of the variation of the displacement function with depth in the ground. The two element types give answers which converge for large numbers of elements. Fewer polynomial elements are required than linear ones to achieve convergence, and this leads to greater computational efficiency.

Computing hardware has been identified which will provide timely calculations from the model. A number of model extensions have been suggested, which would improve the realism of the model and increase the number of practical situations to which the model could be applied.