ASSESSMENT OF TRACK-GROUND COUPLED VIBRATION INDUCED BY HIGH-SPEED TRAINS

Miss Jou-Yi Shih

Dynamic group, ISVR, University of Southampton

Supervisor: Prof. David Thompson, Dr. Antonis Zervos

10th June. 2014

TRACK 21

Railway Track for the 21st Century

- Time-domain models are needed to investigate vehicle/track/ground interaction.
- A time-domain finite element model of track and ground is developed in ABAQUS.
- Moving dynamic loads of a high-speed train are distributed through the track components, the ballast, slab and the subgrade. Critical speeds are also assessed.
- Investigate the effect of the nonlinearity to the whole system

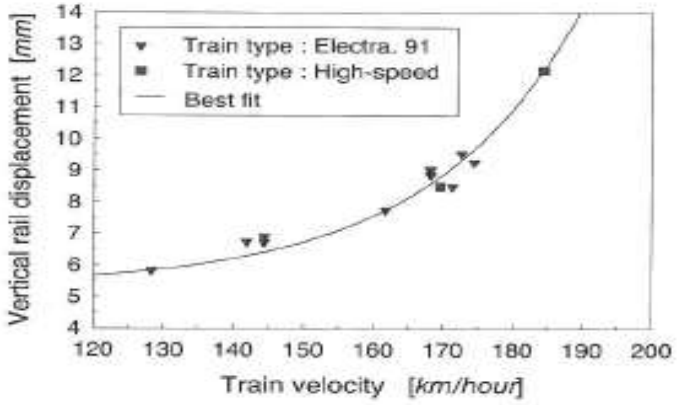
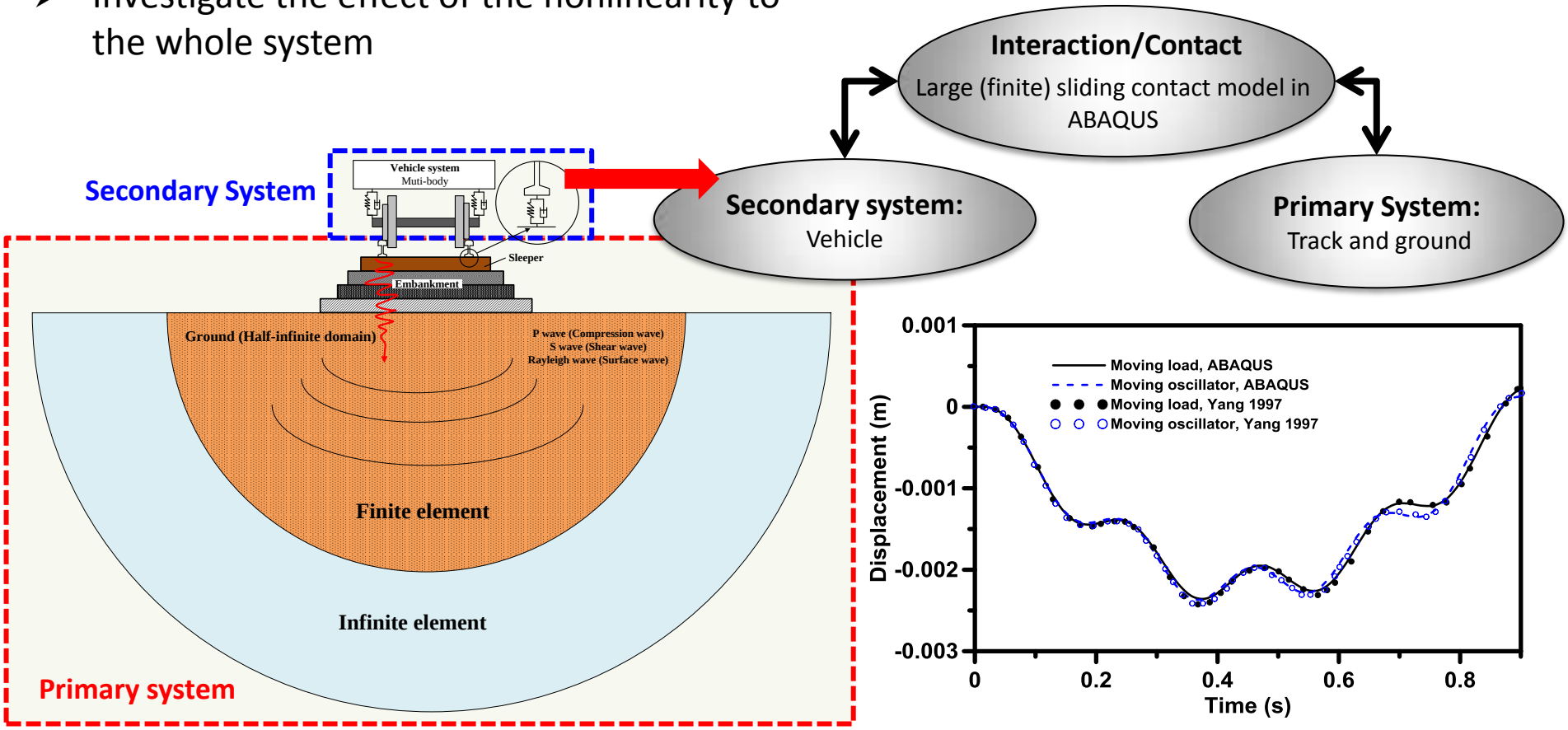
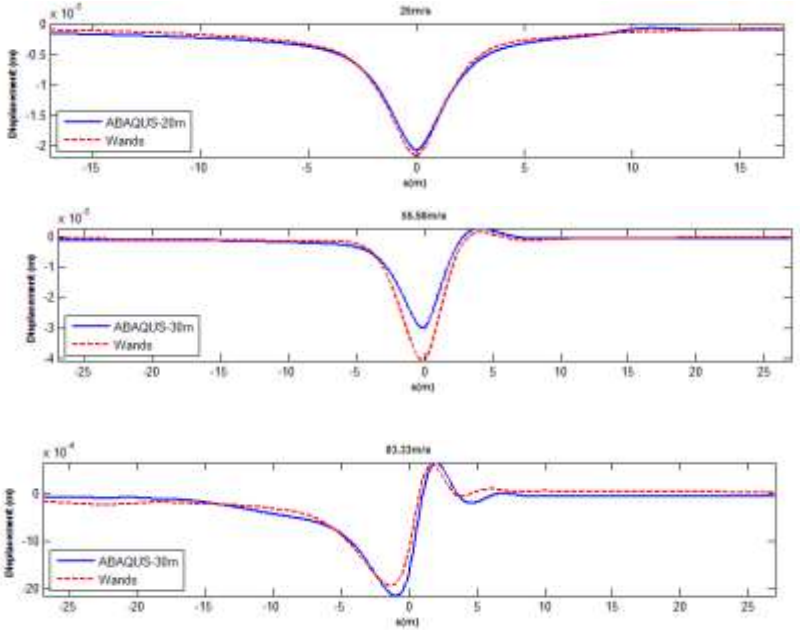
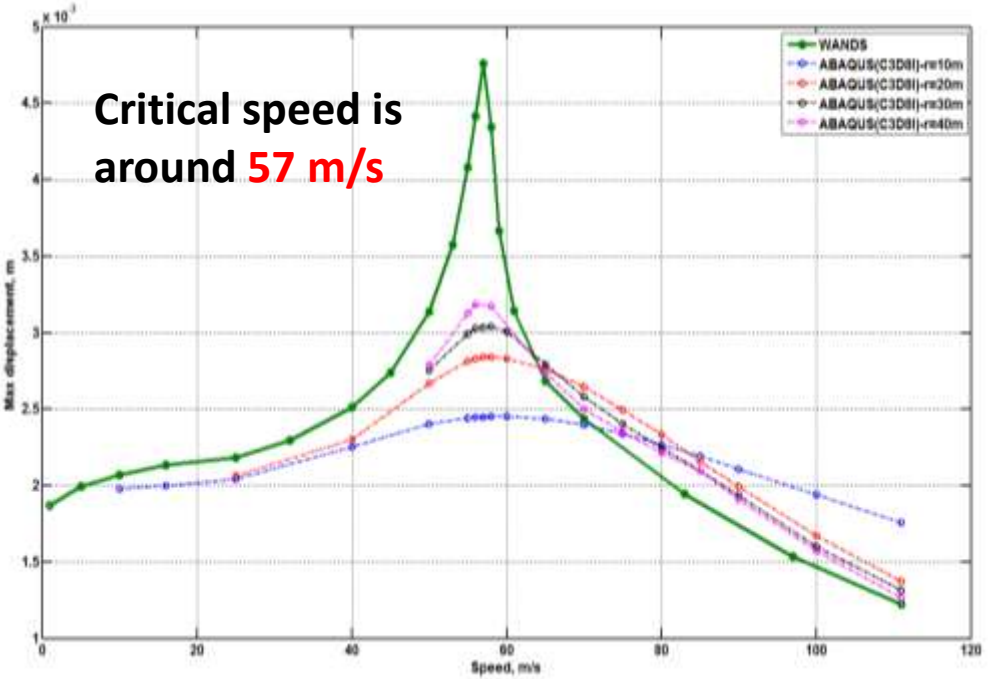


Figure 2.1: Vertical rail displacement at different train velocities, measured at Stilton Fen, England, January-May 1993. Reprinted from Hunt (1994), with kind permission of Union Railways Limited, London.







- A three-dimensional time-domain model of a coupled vehicle, track and ground has been developed in the FE software ABAQUS.
- A new analysis approach has been adopted for modelling the moving vehicle without the need for a user-defined subroutine.
- Good agreement is found with other models but close to the critical speed the amplification is under-predicted. Results need to have enough time to converge.
- In the future track and soil non-linearity will be added.