A holistic approach for the design and assessment of railway tracks

Dimitrios Kostovasilis, Mohammed F.M. Hussein, David J. Thompson

Dynamics Group, Institute of Sound and Vibration Research

Overview
• Continuous investments are made worldwide in railway infrastructure
• The performance of tracks is crucial for the successful operation of the railway
• A lot of research has taken place for the understanding of the performance of various parts of the railway system
• Main focus has been given on individual aspects of the design

but
Changes that can benefit one aspect of the design, should be checked as they may have negative impact on others

Ride quality

Rolling Noise

Ballast and subgrade deterioration

Component degradation

Ground-borne noise & vibration

Rail fatigue

Preliminary model
Preliminary holistic tool developed that utilises:
• A model based on TGV to calculate:
  - ground-borne noise and vibration by using empirical relationships for building response
  - ride quality by additional calculations of the vehicle response
• A model based on TWINS to calculate:
  - Rolling noise from wheel and track

Objectives
• Develop a tool that considers and integrates all aspects of track design
• Identify key parameters influencing track behaviour and performance
• Investigate the level of interaction of individual components and how they influence the specified indicators

Future work
• Implement additional indicators to preliminary model
• Conduct parametric study to identify key parameters involved in track behaviour
• Use multi-criteria optimization in order to find global optimum design

Contact: d.kostovasilis@soton.ac.uk