Numerical and experimental study of wheel-rail impact vibration and noise generated at an insulated rail joint

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Highlights:

- High-frequency impact vibration and noise up to 10 kHz are successfully reproduced.
- The model is validated by a comprehensive hammer test and a pass-by measurement.
- The f2 and pinned-pined resonances strongly influence impact vibration and noise.
- Impact vibration and track decay rate determine the main frequency of impact noise.
- This paper may contribute to the mitigation of impact vibration and noise at IRJs.