

Generation of synthetic track irregularities to evaluate riding comfort using Multibody simulations.

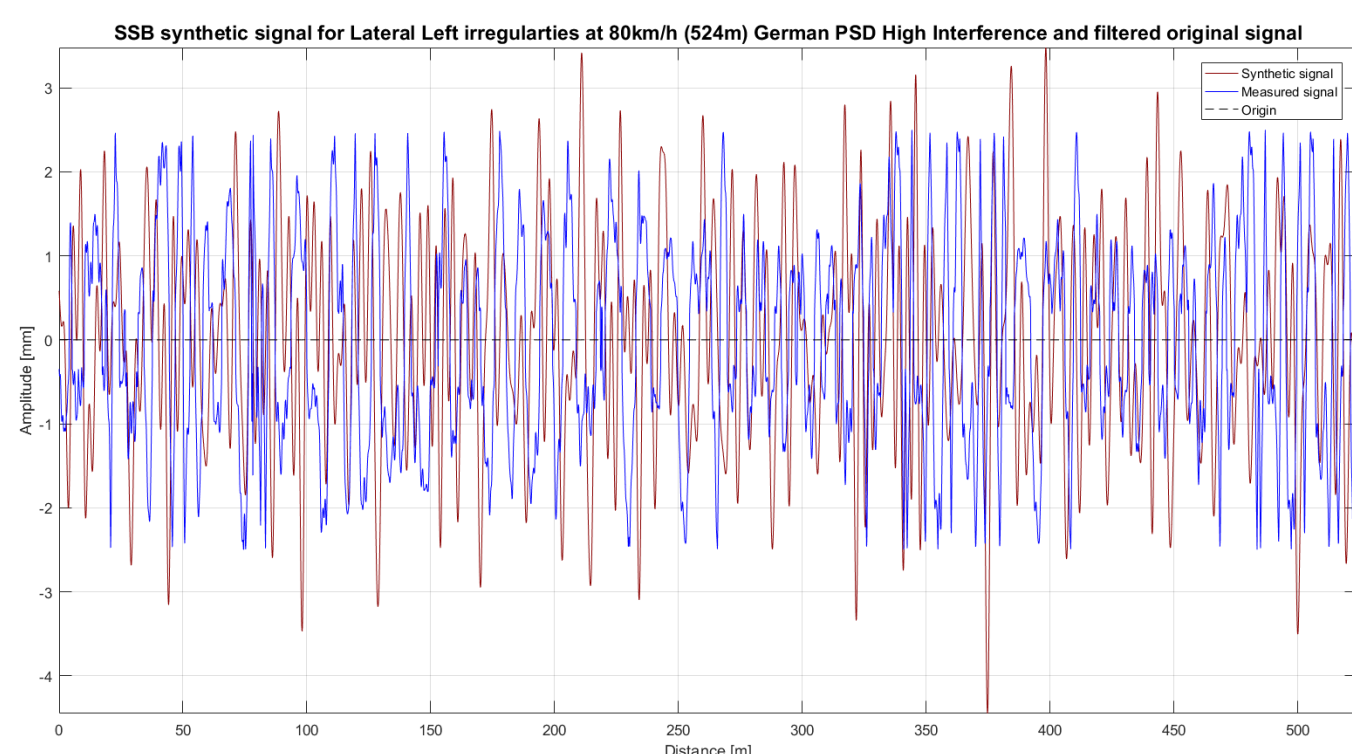
Abstract

Nowadays signal processing plays an important role in railway engineering, as characterization and stochastic generation of railway track geometry allows analysts to predict and prevent deterioration and discrete events in railway systems. The work described in this thesis provides an efficient method to generate synthetic track irregularities preserving the most representative statistical characteristics of the studied infrastructure network beginning with the analysis of the state of a southern German track from May 2013 until September 2016 to later be compared and validated in the frequency and spectral domain of signals generated in a multi-body assessment in the Simpack software, but in a lower track quality, meaning with the lowest standard deviation admissible possible before derailment, which fulfills the minimum requirements for a ride comfort assessment.

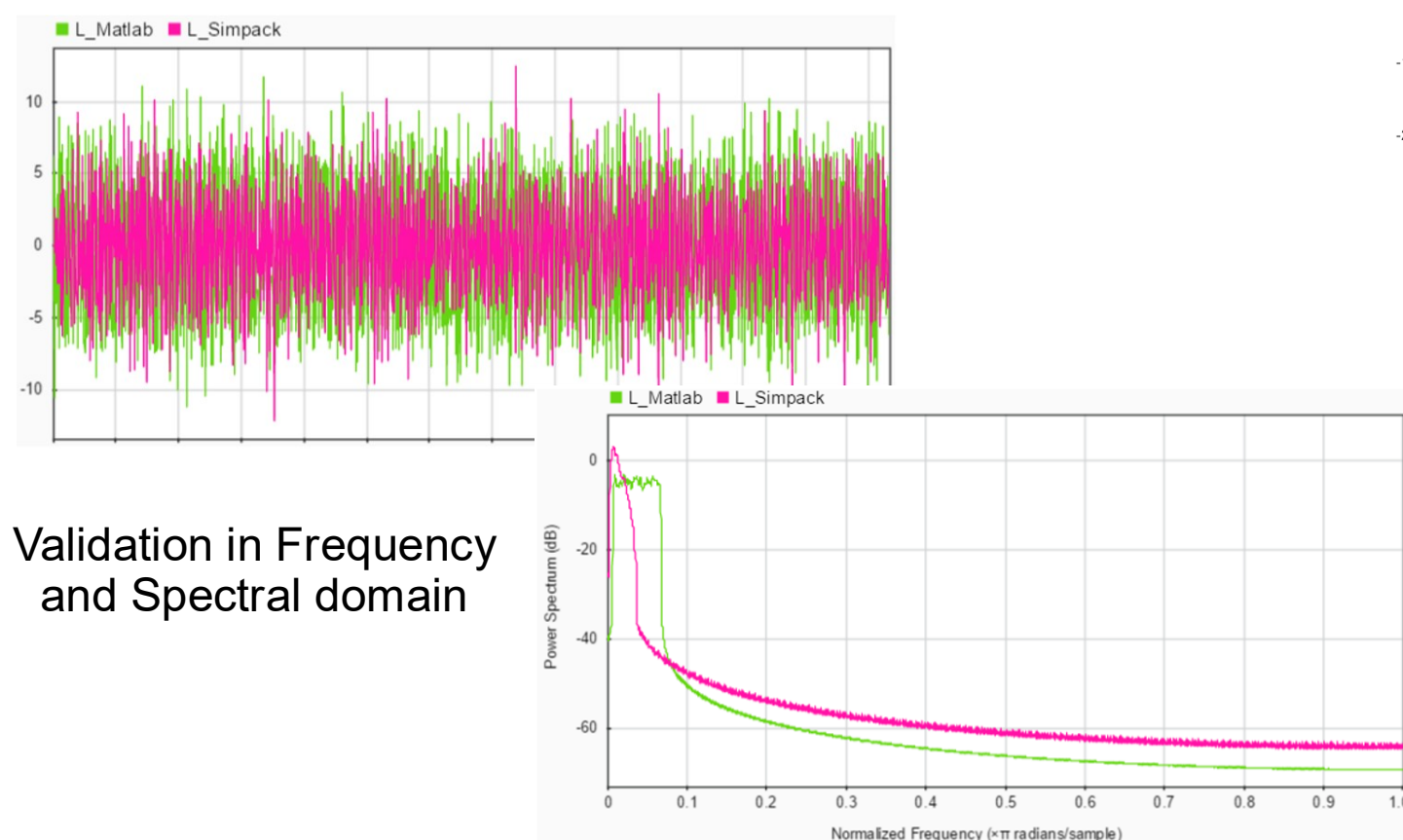
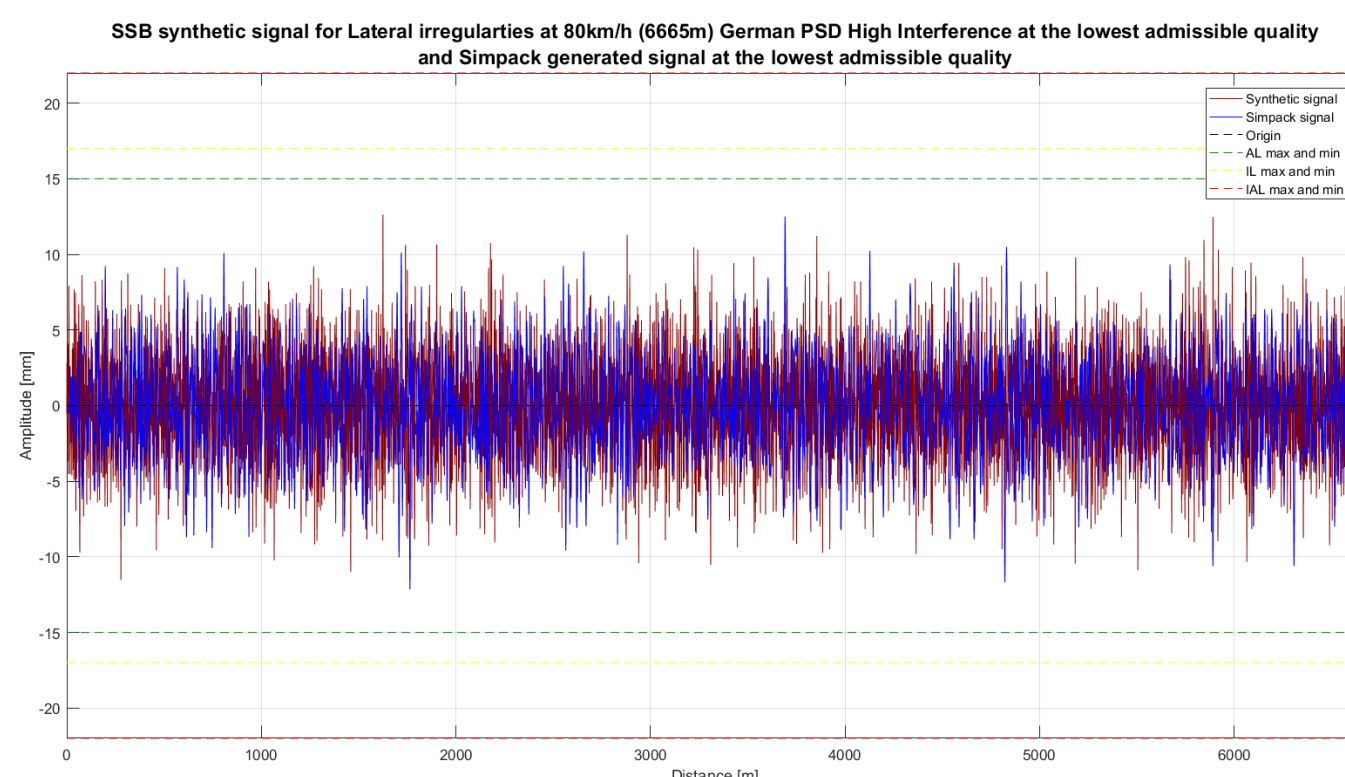


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Comparison of SSB Track 330 filtered original lateral irregularities signal Vs synthetic representative signals



Comparison of generated signals at the SSB Track 330 lowest admissible quality before derailment in multi-body simulations (Simpack) Vs mathematical method (Matlab)



Validation in Frequency and Spectral domain

Statistical parameters calculated in both multi-body simulation and mathematical method

	Irregularity type		
	Lateral	Vertical	Gauge
Standard deviation in Simpack	3.2	25.8	5.2
Standard deviation in Matlab	3.178	25.79	4.96
Maximum value in Simpack	12.5	93.2	17.6
Maximum value in Matlab	12.478	93.28	18.2

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