

## **A Detection Method of Faults in Railway Pantographs Based on Dynamic Phase Plots**

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**Abstract :** Systems for detection of damages in railway pantographs effectively reduce the cost of maintenance and improve time scheduling. In this paper, we present an approach to design a monitoring tool fitting strong customer requirements such as portability and ease of use. Pantograph has been modeled to estimate its dynamical properties, since no data are available. With the aim to focus on suspensions health, a two Degrees of Freedom (DOF) scheme has been adopted. Parameters have been calculated by means of analytical dynamics. A Finite Element Method (FEM) modal analysis verified the former model with an acceptable error. The detection strategy seeks phase-plots topology alteration, induced by defects. In order to test the suitability of the method, leakage in the dashpot was simulated on the lumped model. Results are interesting because changes in phase plots are more appreciable than frequency-shift. Further calculations as well as experimental tests will support future developments of this smart strategy.

**Keywords :** pantograph models, phase plots, structural health monitoring, damage detection

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