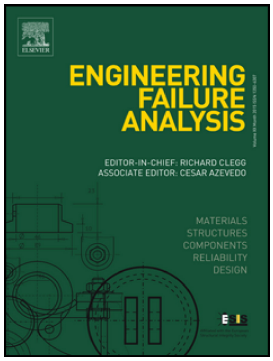

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Experimental and numerical study for detection of rail defect.

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Abstract

Condition monitoring methodologies have become an important part in maintenance programs for any type of structure towards prevention of catastrophic accidents. Natural frequency analysis is a useful methodology to evaluate the integrity condition of structural elements, such as: rotor beams, rails and almost every machine component. In this work, two techniques were applied for condition monitoring of rails: numerical, using the Finite Element Method (FEM), and experimental analysis. Sections of a rail 115RE had been characterized in the field for integral track section and laboratory for integral and artificial cracks conditions at different depths, in free-free boundary condition. Numerical simulation was used to compare and validate the experimental analysis. The changes in natural frequencies were observed as a function of the crack depth. It was performed a sensitivity analysis of natural frequency variation due to the influence of the crack depth and the section dimensions in order to explore the behaviour in modes of vibration. In addition, this monitoring technique can be potentially used as a criterion of when is necessary whether or not to eliminate the crack by gridding or replace the entire rail section. Finally, the finite element simulation was validated throughout natural frequencies measurements in the railway network.

Key words

Natural frequencies analyses, railway systems, crack detection.

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