

# Comparison Study of Different Features for Pocket Length Quantification of Angular Defects Using Eddy Current Pulsed Thermography

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**Abstract—** As one promising nondestructive testing technique, eddy current pulsed thermography has been used for detecting the defects in rail tracks, e.g., rolling contact fatigue (RCF) cracking. This paper introduces and compares three features for the pocket length quantification of artificial angular defects and natural RCF cracks. Specifically, the maximum thermal response and two principal component analysis (PCA)-based features (PCA-based thermal pattern and PCA-based first-order differential pattern) are utilized to quantify the pocket length by linear fitting. For evaluating and comparing the fitted relations between three introduced features and the pocket length, two criteria ( $R^2$  and 2-norm of the residual) are used. Through comparisons, three features' strengths and limitations are summarized. Furthermore, a real RCF specimen is used to verify the comparison results.

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