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Quantitative evaluation of crack depths and angles for pulsed eddy current non-destructive testing (Article)

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Abstract

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Cracks with inclination angles may potentially cause damage to a larger region in the tested structures. Their characterization, in terms of depth and angle, is therefore paramount for ensuring the integrity of the specimen under test. This study extracts features from Pulsed eddy current (PEC) signals obtained in a linear scan, perpendicular to the simulated surface cracks. The novel features extracted, termed skewness, LLS and LS_{max} , are capable of defining crack depth and inclination angles simultaneously. Multiple linear regression (MLR) was built to perform depth prediction, and the pre-determined depths were used in the hierarchical linear model (HLM) for angle prediction. The results were then compared with depth and angle prediction using artificial neural network (ANN). Better reliability of the ANN model with recorded RMSE of 0.198 mm and 2.903° in depth and angle prediction are highlighted. ANN is favourable in handling simultaneous prediction of crack depth and inclination angles, when using interdependent features. Meanwhile, HLM is still approved as a technique to provide a preliminary understanding of the crack parameters. © 2018 Elsevier Ltd

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Topic: Eddy currents | Eddy current testing | pulsed eddy

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Author keywords

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Multiple linear regression Pulsed eddy current

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Neural networks

Engineering uncontrolled terms: Defect quantifications Hierarchical linear modeling Linear scan Multiple linear regressions
Pulsed eddy current

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References (24)

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- 1 Azaman, K.N., Sophian, A., Nafiah, F.
Effects of Coil Diameter in Thickness Measurement Using Pulsed Eddy Current Non-destructive Testing ([Open Access](#))

(2017) *IOP Conference Series: Materials Science and Engineering*, 260 (1), art. no. 012001. Cited 3 times.
<http://www.iop.org/EJ/journal/mse>
doi: 10.1088/1757-899X/260/1/012001

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- 2 Sophian, A., Tian, G., Fan, M.
Pulsed Eddy Current Non-destructive Testing and Evaluation: A Review ([Open Access](#))

(2017) *Chinese Journal of Mechanical Engineering (English Edition)*, 30 (3), pp. 500-514. Cited 20 times.
doi: 10.1007/s10033-017-0122-4

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- 3 Wang, X., Xie, S., Wang, L., Li, Y., Chen, Z., Takagi, T.
Reconstruction of stress corrosion cracks based on pulsed eddy current signals

(2012) *2012 6th International Conference on Electromagnetic Field Problems and Applications, ICEF2012*, art. no. 6310346. Cited 6 times.
ISBN: 978-146731335-3
doi: 10.1109/ICEF.2012.6310346

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- 4 Xie, S., Chen, Z., Chen, H.-E., Wang, X., Takagi, T., Uchimoto, T.
Sizing of wall thinning defects using pulsed eddy current testing signals based on a hybrid inverse analysis method

(2013) *IEEE Transactions on Magnetics*, 49 (5), art. no. 6514798, pp. 1653-1656. Cited 25 times.
doi: 10.1109/TMAG.2012.2236827

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- 5 Hosseini, S., Lakis, A.A.
Application of timefrequency analysis for automatic hidden corrosion detection in a multilayer aluminum structure using pulsed eddy current

(2012) *NDT and E International*, 47, pp. 70-79. Cited 23 times.
doi: 10.1016/j.ndteint.2011.12.001

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