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Eddy current signal processing applied to aircraft fuel tubes maintenance

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Large aircraft have a hundred meters long of fuel tubes that must be inspected during maintenance work services. The layout of those tubes is noticeable complex and the access for inspection is frequently very difficult. Eddy current non-destructive testing is one of the most important inspection methods and widely used to inspect the tubes by inserting inspection probes. Eddy current signals generated during the maintenance inspection work, in general, contain noise, which hinders the signal analysis and reduces the reliability of the inspection conclusion. Namely one of the noises present in the signals is the probe wobble effect, which is caused by the necessary slack between the probe and the fuel tube. In this work, Wavelet Transforms (WT) are used for de-noising the probe wobble Eddy current signals. WT provides defect localization across the tube length making it better than other analysis methods such as the Fourier Transform. However, WT involves wavelet and coefficients selection in the user level of analysis. This work presents probe wobble signal de-noising examples with several wavelet and coefficients applied to Eddy current signals generated by a Zetec MIZ-17ET equipment on an inspection of a 19.05mm diameter stainless steel fuel tube with known artificial defects. The probe wobble signal de-noising offers reliable results and is a promising method as it allows a fast removal of Eddy current noise maintaining the essential signal information.

Biography

Luiz Antonio Negro Martin Lopez is a PhD, mechanical engineer, airplane pilot and helicopter flight instructor. His PhD thesis was about artificial intelligence and Wavelet Transform applied to Eddy current signals generated by tubes inspection during maintenance works. Over the years he joined his two professional passions, engineering and flying, focusing safety improvements in aircraft. He has shared his knowledge with engineering and aviation students in several educational institutions in addition to his work at engineering companies.

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