Comparative study between EKF and Geometrical methods for theAcoustic Emission source localization.

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Abstract : The purpose of this paper is to optimize and apply probabilistic methods and compare the obtained results to geometric method for locating acoustic emission (AE) source in a plate-like structure. The time of arrival (TOA) of the AE waves in each sensor taking into account the uncertainties, was determined by the continuous wavelet transform (CWT). Then the group wave's velocity was calculated by Monte Carlo simulation. As a probabilistic method, the extended Kalman filter (EKF) is used to iteratively estimate the location of AE sources. Experimental results have shown that the probabilistic method estimates thelocation of the pencil lead break better than the geometric method.Experimental tests were performed on a copper plate to validate the comparison of the two approaches performances.

Keywords : Acoustic Emission (AE), Time of arrival (TOA), Continuous Wavelet Transform (CWT), Monte Carlo simulation, Geometrical method, Extended Kalman Filter (EKF)