

Application of pseudo-stochastic excitation in ultrasonic echo experiments for improved time-resolution at low frequencies

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Accurate time-delay estimation is a prerequisite for determining geometric dimensions with ultrasonic pulse-echo methods. At low frequencies, conventional short-pulse excitation is limited by the trade-off between signal energy and time resolution.

The contribution applies pseudo-stochastic coded excitation to ultrasonic echo experiments. The extended excitation signal increases the transmitted energy, while correlation-based processing compresses the received response in time and supports a more precise separation of echoes.

The method is presented as an approach for improving time resolution and robustness at low ultrasonic frequencies. It is intended for non-destructive measurements in materials where attenuation and limited bandwidth make conventional pulse-echo evaluation difficult.