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Improving signal analysis for nonlinear time reversed acoustics: simulation results

Marco Scalerandi and Antonio Gliozzi
Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129 Torino, Italy

Nonlinear Time Reversed Acoustics have attracted attention as a tool to localize and identify nonlinear defects in solids [1-4]. The procedure is based on extracting the features due to the nonlinear scatterers from the signals received at the transducer array and back-propagate only the resulting portion of the signals. The usual approach is to filter the received signals to keep only contributions due to higher order harmonics or sidebands. As a result, the signals are very small in amplitude and can be not detectable if transducers are located far from the scatterers. It is evident the need for novel signal processing tools to increase the signal-to-noise ratio of the nonlinear contributions. We have recently proposed a Scaling Subtraction method [5], which is applied here to Non Linear Time Reversal virtual experiments, showing the improvements in the signal-to-noise ratio, with resulting better imaging of the nonlinear scatterer. Results will be presented for two approaches to Non Linear Time Reversal.
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