

TIME DELAY COMPENSATION IN FINITE-ORDER MODELS OF ACOUSTIC WAVE PROPAGATION IN HOMOGENOUS MEDIA

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ABSTRACT

Finite-order models do not completely account for the delay in acoustic wave propagation and thus require an additional phase correction, besides parameter adjustments to fit experimental measurements. As a consequence, it is necessary to determine the time or phase delay of a finite-order model as a function of excitation frequency and model order.

In this work a homogenous, one-dimensional medium is discretized in finite a number of elements. Two methods were developed to derive the transfer function of wave transmission for an arbitrary number of elements. Results from the two methods were verified with transfer functions computed from state space models developed in the time domain. The transfer functions were used to evaluate the model time delays and consequently the needed additional time delay corrections for a given system. Experimental data were collected and used, to verify utility of the method. By providing the time delay correction, the method helps enhance the model parameter estimation process.