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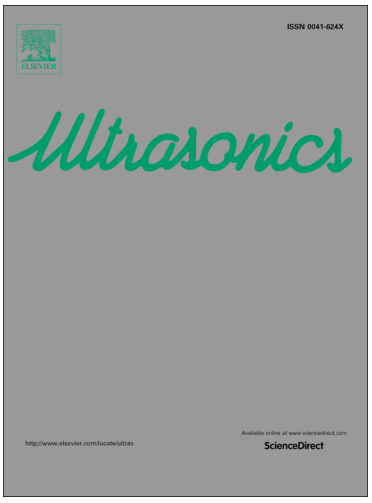


# Attenuation Estimation by Repeatedly Solving The Forward Scattering Problem

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# Attenuation Estimation by Repeatedly Solving The Forward Scattering Problem

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*Abstract* – **Estimation of the attenuation is important in medical ultrasound not only for correct time-gain compensation but also for tissue characterization. In this paper, the feasibility of a new method for attenuation estimation is tested. The proposed method estimates the attenuation by repeatedly solving the forward wave propagation problem and matching the simulated signals to the measured ones. This approach allows avoiding common assumptions made by other methodologies and potentially allows to account and correct for other acoustic effects that may bias the attenuation estimate. The performance of the method was validated on simulated data and on data recorded in tissue mimicking phantoms with known attenuation properties, and was compared to the spectral-shift and spectral-difference methods. Simulation results showed the different methods to have good accuracy when noise-free signals were considered (the average relative error of the attenuation estimation did not exceed 15 %). However, the accuracy of the conventional methods decreased rapidly in the presence of measurement noise and varying scatterer concentration, while the relative error of the proposed method remained below 15 %. Furthermore, the proposed method outperformed conventional attenuation estimators in the experimental phantom study, where its average error was 8 %, while the average error of the spectral-shift and spectral-difference methods was 26 % and 32 %, respectively. In summary, these findings demonstrate the feasibility of the proposed approach and motivate us to refine the method for solving more general problems.**

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