Calibration of Field II using a Convex Ultrasound Transducer - DTU Orbit (28/12/2018)

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Field II is an ultrasound simulation program capable of simulating the pressure scattering from inhomogeneous tissue. The simulations are based on a convolution between spatial impulse responses from the field in front of the transducer and the vol-to-surface acceleration impulse response of the transducer. For such simulations to reflect actual measured intensities and pressure levels, the transducer impulse response is to be known. This work presents the results of combining a modified form of a 1D linear transducer model originally suggested by Willatzen with the Field II program to calibrate the pressure simulations of a 128 element convex medical transducer with elevation focus at 70mm. The simulations are compared to pressure measurements from an automatic water bath needle hydrophone setup. The transducer was driven at 4.0 MHz using a research scanner with a commercial transducer amplifier from BK-Medical (Herlev, Denmark). As input waveform for the Field model we measured the output voltage of the research amplifier, which peak voltage was limited to 31 V to avoid too high non linear effects. We measured the hydrophone output from three transducer front elements by averaging 40 shoot sequences on each element using a remotely controlled Agilent MSO6014A oscilloscope. The pressure along the elevation line in 32 mm, 70 mm (elevation focus) and 112 mm for each element are measured.

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