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# Deconvolution of freehand 3D ultrasound data using improved reconstruction techniques in consideration of ultrasound point spread functions

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Medical ultrasound data suffers from blur caused by the volume expansion of the pressure field of the mechanical wave. This blur is dependent on the used excitation pulse and focusing of the ultrasonic wave and can therefore be examined. In order to improve the overall system resolution for 3D ultrasound reconstructions we have to know this signal degeneration to compensate it using deconvolution techniques or multicode compounding during the volume reconstruction step. Looking at the ultrasound transfer function we can focus on the simulation and measurement of the "point spread function" especially in the lateral and elevational direction. To understand its effects on a 3D reconstruction we compute a simulation of freehand-ultrasound slices based on synthetic phantom structures and given US parameters. Computing a 3D reconstruction of these simulated slices we are able to optimize the reconstruction algorithm itself to archive better resolution in the volume data sets considering ultrasound parameters like beamforming and the excitation pulses.