3-D Ultrasound Imaging Performance of a Row-Column Addressed 2-D Array Transducer: A Measurement Study - DTU Orbit (11/08/2019)

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A real-time 3-D ultrasound measurement using only 32 elements and 32 emissions is presented. The imaging quality is compared to a conventionally fully addressed array using 1024 elements and 256 emissions. The main-lobe of the measured line spread function is almost identical, but the side-lobe levels are higher for the row-column addressed array. The cystic resolution sampled at a relative intensity difference of 20 dB shows a cyst size of 5.00mm for the row-column addressed array and 2.39mm for the fully sampled array. A simulation study is carried out which compares how the imaging quality of the two addressing methods scales with the number of beamforming channels used. It is shown that for any fixed number of active elements, a row-column addressed array achieves a better image quality than fully addressing the array. When using 128 channels, the mainlobe when fully addressing the array is 510% larger than when row-column addressing the array. The cyst radius needed to achieve -20 dB intensity in the cyst is 396% larger for the fully addressed array compared to the row-column addressed array. The measurements were made using the experimental ultrasound scanner SARUS and a 32x32 element ultrasound probe made by Vermon S.A.

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