

Resolution and contrast enhancement of synthetic aperture ultrasound imaging using dual stage beamforming

S. Faridsoltani, B. Mohammadzadeh Asl*

Electrical and Computer Engineering Department, Tarbiat Modares University, Tehran.

Abstract

In this paper, a two stage synthetic aperture sequential beamforming (SASB) is presented to obtain better lateral resolution besides more range independent lateral resolution and contrast enhancement compared to dynamic receive focusing (DRF) method. Proposed two stage beamforming includes two sequential beamformers. First, a set of B-mode image lines using a single focal point in both transmit and receive are stored. The second stage uses the focused image lines from the first stage as input data, so a high resolution image will be obtained. Obtained results show for the lateral resolution (in terms of FWHM) there is improvement of almost a factor of 2.5 (dB 6) compared to DRF method. The proposed method on average improves 5 dB and 60% in contrast ratio (CR) and contrast to noise ratio (CNR) compared to DRF method, respectively. Also, the SASB image for the simulated phantom clearly shows the 2 mm diameter cyst which is not detectable in the DRF image.

Keywords: Ultrasound imaging, Synthetic aperture, Dynamic receive focusing method, Sequential beamforming.

pp. 29-39 (In Persian)

* Corresponding author E-mail: babakmasl@modares.ac.ir