Doctoral School of Information and Biomedical Technologies Polish Academy of Sciences

Subject
Development and optimization of effective algorithms for visualization of ultrasonic signals

Supervisors, contact, place of research
prof. dr hab. Jerzy Litniewski (jlitn@ippt.pan.pl,tel. tel. +48 22826 98 41, tel. 228261281 ext. 238), IPPT PAN, Pawińskiego 5b
Assistant Supervisor: dr Norbert Żołek (nzolek@ippt.pan.pl, tel. 228261281 ext. 335)

Project Description
The quality of ultrasound images is crucial in diagnostics. The development of miniaturized ultrasound devices requires the optimization of image quality as well as the optimization of signal processing algorithms. As part of the work, attempts will be made to optimize existing algorithms from the point of view of the quality of images obtained using synthetic data (numerical simulations) as well as real data obtained from measurements on tissue mimicking fantoms and the use of machine learning to optimize this processing. The aim of the work is to develop and optimize effective transmitting and receiving patterns/schemas for ultrasonic visualization using various types of transducers and to assess the quality of the images obtained.

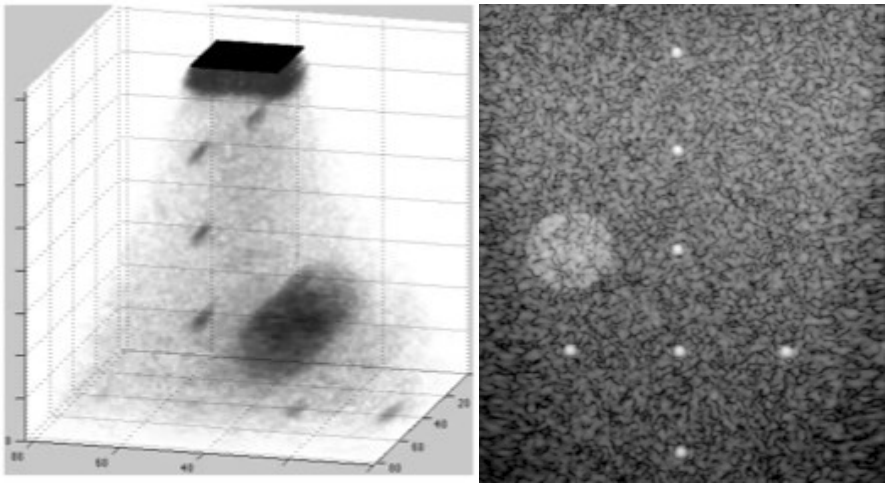

Fig. 1 Example reconstruction of ultrasound data

Requirements: knowledge of the MATLAB environment. Knowledge of other environments for data analysis (R, Mathematica, etc ...), basics of ultrasound is welcome.

Bibliography
1. P. Kruizinga, F. Mastik, N. de Jong, A. F. W. van der Steen and G. van Soest, "Plane-wave ultrasound beamforming using a nonuniform fast fourier transform," in *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, vol. 59, no. 12, pp. 2684-2691, Dec. 2012.
2. D. Garcia, L. le Tarnec, S. Muth, E. Montagnon, J. Porée, and G. Cloutier, “Stolt’s f-k Migration for Plane Wave Ultrasound Imaging”,in *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, vol. 60, no. 9, pp. 1853-1867, Sep. 2013.

updated: May 2, 2020