University of Victoria | Graduate Studies

Notice of the Final Oral Examination
for the Degree of Master of Applied Science

of

HAROON ALI AKBAR

BEE (National University of Sciences and Technology, 2016)

"Efficient Similarity-Driven Emission Angle Selection for Coherent Plane-Wave Compounding"

Department of Electrical and Computer Engineering

Wednesday, September 19, 2018
10:00 A.M.
Engineering Office Wing
Room 230

Supervisory Committee:
Dr. Daler Rakhmatov, Department of Electrical and Computer Engineering, University of Victoria (Supervisor)
Dr. Mihai Sima, Department of Electrical and Computer Engineering, UVic (Member)

External Examiner:
Dr. Venkatesh Srinivasan, Department of Computer Science, UVic

Chair of Oral Examination:
Dr. Karen Urbanoski, School of Public Health and Social Policy, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies

Abstract

Typical ultrafast plane-wave ultrasound imaging involves: 1) insonifying the medium with several plane-wave pulses emitted at different angles by a linear transducer array, 2) sampling the returning echo signals, after each plane-wave emission, with the same transducer array, 3) beamforming the recorded angle-specific raw data frames, and 4) compounding the beamformed data frames over all angles to form a final image. This thesis attempts to address the following question: Given a set of available plane-wave emission angles, which ones should we select for acquisition (i.e., which angle-specific raw data frames should we sample), to achieve adequate image quality at low cost associated with both sampling and computation?

We propose a simple similarity-driven angle selection scheme and evaluate its several variants that rely on user-specified similarity measurement thresholds guiding the recursive angle selection process. Our results show that the proposed scheme has a low computational overhead and can yield significant savings in terms of the amount of sampled raw data.