Title: Non-invasive Estimation of Intravascular Pressure Changes Using Ultrasound

Speaker: Mr. Jacob B. Olesen
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Date: Monday, 2 March 2015
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Venue: Room 603, Chow Yei Ching Building

Abstract:
Abnormal changes in intravascular blood pressure are usually an indication of a diseased vessel. Measuring pressure variations is therefore used clinically as a diagnostic marker in assessing the physiological state of a cardiovascular region. Intravascular pressure is currently assessed by inserting pressure sensing wires or catheters to the femoral artery and threading them to the region of interest. These procedures, however, suffer some severe limitation as they are highly invasive and require the use of ionizing radiation for guidance of the pressure sensory device. This presentation concerns the development of a non-invasive method for estimating intravascular pressure changes using ultrasound. The suggested method estimates pressure gradients from 2-D vector velocity fields. Changes in pressure are derived using a model based on the Navier-Stokes equations. Scans of a carotid bifurcation phantom with a 70% constriction are performed using a linear array transducer connected to the experimental scanner, SARUS. 2-D fields of angle-independent vector velocities are acquired to a depth of 3 cm using directional synthetic aperture vector flow imaging. The performance of the suggested estimator is evaluated by comparing its results to a 3-D numerical simulation model, which geometry is reconstructed from MRI data.

Biography of the speaker:
Jacob B. Olesen is a Ph.D. candidate in the Center for Fast Ultrasound Imaging at the Technical University of Denmark. Jacob graduated as a biomedical engineer in 2012 from the same university, where he majored in signal processing and fluid mechanics. His PhD research focuses on the development of a non-invasive technique for measuring local pressure changes across constricted vessels. The project aims to provide the physician with a diagnostic tool that will assess the severity of a diseased vessel without the use of invasive
pressure catheters. Before being lured into the field of medical ultrasound, Jacob had worked on a method for evaluating the performance of cardiovascular surgeons using electromyography. He dreams to continue working with techniques that improves the life of patients suffering from cardiovascular diseases.

**Organizer:**  Dr. A.C.H. Yu