



---

**Title: Optimal Ultrasonic Pulse Compression and Synthesis for Imaging Applications**

**Speaker:** Dr. Biao Cheng, New Jersey Institute of Technology, Newark, NJ

**Date:** December 6, 2007 Thursday

**Time:** 5-6pm

**Location:** 211 KUPF, New Jersey Institute of Technology, Newark, NJ 07102

**Abstract:** Ultrasound imaging is a non-invasive/non-ionizing tool in medical diagnostics. In recent years, the use of Quantitative Ultrasound System (QUS) has become more widespread due to its potential advantages over CT, MRI, and X-ray in terms of cost, size, safety, and detection resolution. A major consideration of ultrasound imaging and QUS is the resolution. Traditionally, improved resolution is achieved by increasing the operating frequency at the expense of reduced penetration and higher cost. Furthermore, successive signal packets tend to interfere with each other due to transducer transients which further limit the detection resolution. This talk introduces a method to compress acoustic pulses to pre-specified short durations. Also referred to as the Low Transient Pulse (LTP) method, it can be a key enabling factor for better imaging/detection performance for ultrasound diagnostic systems. The LTP method is an innovative technique to produce a short duration and low transient acoustic pulse by means of pre-shaping the excitation signal. It has been experimentally verified that the LTP method produces a better detection resolution and simpler hardware implementation due to less phase interference and a less complex algorithm. No modulation circuits or regenerative loops are necessary to synthesize the drive signal. Within the quantitative ultrasonography context, the LTP method improves detection resolution by minimizing aliasing of signals transmitted from soft and hard tissues.

**Biography:** Biao Cheng received the B.S. degree in Electrical Engineering from Rutgers University. He received his M.S. and Ph.D. degrees in Electrical Engineering from New Jersey Institute of Technology. Currently he is a postdoctoral fellow at the department of Electrical Engineering of New Jersey Institute of Technology. His research interests include control systems, piezo-electronics, embedded systems, digital signal processing, and ultrasound imaging.

---

**Travel directions:** <http://www.njit.edu>

**For Further information:** Contact Professor Timothy Chang (973) 596-3519, [changtn@njit.edu](mailto:changtn@njit.edu).