Acousto-optic imaging (AOI) of optical variability in a diffusive medium is a relatively new technique based on the interaction of multiply-scattered coherent laser light with an ultrasonic field. The two waves “mix” and the light emanating from the interaction region is phase modulated at the ultrasound frequency. This technique yields information on both the optical and acoustic properties of the interaction volume, which, since the optical field is diffuse, is determined by the dimension of the ultrasonic beam. Much of the previous work in this area employed continuous wave (cw) ultrasound to pump the acousto-optic response. We argue in favor of using pulsed ultrasound, based on regulatory considerations related to bioeffects and enhanced axial resolution along a scan line. We describe a system in which a commercial ultrasound scanner was combined with a photorefractive crystal (PRC) based optical detection scheme to generate simultaneous 3D images of acoustic and optical properties of optically absorbing inclusions embedded in excised biological tissue. Representative images are presented that demonstrate the utility of this dual mode imaging technique when imaging optically absorbing regions imbedded in tissue phantoms and *ex vivo* lesions generated by high-intensity focused ultrasound. Technological limitations are discussed, as are plans for future work. [Work supported by the Center for Subsurface Sensing and Imaging Systems via NSF ERC award number EEC-9986821].

**Biosketch:** Ronald Roy received a B.S. in Physics and Electrical Engineering from the University of Maine, a M.S. in Physics from the University of Mississippi, and the M.Phil. and Ph.D. degrees in Mechanical Engineering from Yale University. He currently serves as Professor and Chairman of the Department of Mechanical Engineering at Boston University. En route to BU, he served as a Senior Physicist at the Applied Physics Laboratory and an Associate Research Professor of Bioengineering, both at the University of Washington. Prior to that, he served on the research staff at the National Center for Physical Acoustics. Most recently, Roy served as the 65th George Eastman Distinguished Visiting Professor at the University of Oxford (2006-2007).

Trained as a physicist and an engineer, Prof. Roy specializes in the application of physical acoustics principles to problems in biomedical acoustics, industrial ultrasonics, and acoustical oceanography -- however, his true passion is the acoustics of bubbles and bubbly media. Sonoluminescence (light from sound), acoustic cavitation dynamics, and bubble-mediated therapeutic ultrasonics are topics of past and current interest. Most recently, he has joined colleagues in developing new techniques for imaging the optical properties of soft tissues through the nonlinear interaction of light and sound (acousto-optic imaging) and is currently exploring novel ways in which nanoparticles can be used in conjunction with laser illumination and high-intensity focused ultrasound to facilitate both optical imaging and focused ultrasound surgery. Prof. Roy has served on numerous professional society committees, review panels, editorial boards, and is a past Editor-in-Chief of Acoustics Research Letters On Line (now called JASA Express Letters).

**Wednesday, November 19, 2008**

4:00 p.m.

Room A442 Cook Physical Science Building

Refreshments will be provided at 3:30 p.m. in Room A429.