MATHEMATICS COLLOQUIUM

Fluorescence-enhanced optical tomography (molecular imaging)

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Near infrared (NIR) optical imaging is a developing diagnostic tool for cancer screening and is largely based upon the endogenous absorption contrast due to angiogenesis and increased hemoglobin absorbance in tumors. Recently near-infrared excitable fluorescent contrast agents provide yet another method for diagnosis. The advantages associated with fluorescence enhanced optical tomography include (a) additional contrast owing to fluorescence lifetime and absorption and, (b) the design of NIR fluorescent dyes which specifically exhibit changes in decay kinetics in the presence of disease-specific molecular markers. Photographic methods have been the mainstay for fluorescence macroscopy, but emphasis is shifting to photonic methods that use tomographic principles to image optical contrast. Accordingly, a novel image reconstruction algorithm was developed for fluorescence-enhanced imaging and was formulated as a nonlinear least-squares-type simple bounds constrained optimization problem based upon the Penalty/Modified barrier function (PMBF) method. The simple bounds constraints are included in the objective function of the PMBF method and the gradient based truncated Newton method with trust region (CONTN) is used to minimize the function for the large scale problem. Three dimensional images of fluorescence absorption coefficients and lifetimes were reconstructed from experimentally measured data.

Date: Friday, February 2, 2007
Time: 3:00pm-4:00pm
Place: J. Wiener Lecture Hall, MAGC 1.302

Refreshments will be served at 2:55pm.

For further information or for special accommodations, contact Dr. Karen Yagdjian at 381-2145, via email at yagdjian@utpa.edu, or visit www.math.panam.edu/colloquia.html