

MATHEMATICS COLLOQUIUM

Inverse problems in bioluminescence and fluorescence tomography

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Abstract: Bioluminescence and Fluorescence Tomography (B/FT) for in vivo tomographic imaging show tremendous promise as tools for early detection and rapid screening in small animal models of disease, as well as for detailed investigation of molecular function. The inverse problems in B/FT, that involve the 3D reconstruction of underlying light sources in an inhomogeneous animal volume based on optical data measured on the animal surface, are inherently illposed. We have developed methods based on collection of spectral data at multiple wavelengths that help in reducing this illposedness. Further, we have developed fast computational algorithms to solve the B/FT inverse problem that involve an efficient finite-element solver and iterative minimization techniques. An essential requirement for solving the B/FT inverse problem is the estimation of the internal anatomy of the animal. For this estimation, we have developed an atlas-based bijective warping scheme that uses surface-constrained harmonic maps computed by minimizing the covariant harmonic energy. In this talk, I will review our recent progress in efficient computational modeling for B/FT and highlight potential challenges in this rapidly evolving area.

Date: Thursday, **April 17, 2008**
Time: 3:00 pm – 4:00 pm
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