

Department of Applied Mathematics and Statistics
The Johns Hopkins University

SEMINAR

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Friday, April 27, 2007
Seminar: **11:00 a.m.**
in 101 Shaffer Hall
Luncheon reception to follow
in 301 Whitehead Hall

**ULTRASOUND IMAGE ANALYSIS: SPECKLE TRACKING
FOR RECOVERY OF CARDIAC MOTION**

ABSTRACT

3D-reconstruction of organ deformations from ultrasound image sequences is an active goal for on-line medical imaging. We focus here on “speckle tracking” methods in intracardiac echocardiography: After patient’s catheterization, sequences of 2D-images are acquired to successively display views of “parallel slices” of the cardiac muscle. Recovery of 3D non-linear myocardial deformations must overcome the speckle effect, which generates strong dynamic textures, modeled by non-Gaussian multiplicative noise, that tend to decorrelate in time under large deformations. Maximum likelihood formulations for the quality of elastic registration are now known to upgrade motion reconstruction, but may still be refined by more accurate texture matching. Robust solutions for this ill-posed problem have to combine a maximum likelihood formalism with various regularization strategies, including in particular the search for an *a priori* diffeomorphic image sequence registration. This last approach fits nicely with very pragmatic questions about the natural metrics to be used for “diffeomorphic comparisons” of recovered cardiac motion across different subjects.