

STATISTICS/DEAS (EE)
JOINT
COLLOQUIUM

THURSDAY, MARCH 22, 2007
TALK: 4:00 PM — Maxwell Dworkin, Rm. 119

“Laplace Random Vectors in AWGN and the Higher-Density Wavelet Transform”

Ivan Selesnick
Electrical and Computer Engineering
Polytechnic University

ABSTRACT

Wavelet domain statistical modeling of images has focused on modeling the peaked heavy-tailed behavior of the marginal distribution and on modeling the dependencies between coefficients. In the first part of this talk we describe the extension of the Laplace marginal model to the multivariate case so that groups of wavelet coefficients can be modeled together using Laplace marginal models. We derive the nonlinear MAP and MMSE shrinkage functions for a Laplace vector in Gaussian noise and provide computationally efficient approximations to them. The development depends on the generalized incomplete Gamma function.

In the second part of this talk we describe the “higher-density wavelet transform” - a type of over-complete wavelet transform. The construction is simple, yet the wavelets cover the time-frequency plane in an arrangement that provides a higher sampling in both time and frequency. This arrangement leads to an over-complete wavelet transform that is approximately shift-invariant and has intermediate scales (roughly a $\sqrt{2}$ scaling law).