Princeton University
Department of Electrical Engineering
Information Sciences and Systems (ISS)
Seminar ELE 519-Spring 2008

Speaker: Zhi-Quan (Tom) Luo – Professor of Electrical & Computer Engineering, University of Minnesota

Date: Thursday, March 13th

Time: 4:30pm

Room: B205 – Equad

Title: Optimal Spectrum Management: Complexity, Duality and Approximation

Abstract: We consider a class of nonconvex optimization problems arising from spectrum management in multiuser communication. For the discretized version of this problem, we characterize its computational complexity under various practical settings and study the structure of its global optimal solutions. It is shown that this discretized nonconvex optimization problem is NP-hard in general and has a positive duality gap. Surprisingly this duality gap disappears asymptotically as the size of discretization step decreases to zero, thanks to a hidden convexity that can be uncovered by the Lyapunov Convexity Theorem in functional analysis. Based on this asymptotic zero duality result and a Lagrangian dual relaxation, we present, for any positive $\epsilon$, a polynomial time approximation scheme to compute an $\epsilon$-optimal solution for the continuous version of the resource management problem.

Bio: Zhi-Quan (Tom) Luo is a professor in the Department of Electrical and Computer Engineering at the University of Minnesota (Twin Cities) where he holds an endowed ADC Chair in digital technology. He received his B.Sc. degree in Applied Mathematics in 1984 from Peking University, China, and a Ph.D degree in Operations Research from MIT in 1989. From 1989 to 2003 Dr. Luo was with the Department of Electrical and Computer Engineering, McMaster University, Canada, where he eventually served as the department head and held a Canada Research Chair in Information Processing. His research interests lie in the union of optimization algorithms, signal processing and digital communication.