

The University of Chicago

Department of Statistics

Seminar Series

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**“Modeling Nonlinear Long-Range Dependent Time Series
with Application to Internet Traffic”**

MONDAY January 31, 2005 at 4:00 PM
133 Eckhart Hall, 5734 S. University Avenue

Refreshments following the seminar in Eckhart 110.

ABSTRACT

Modeling nonlinear time series is challenging because the stochastic behavior can be very complex. Modeling long-range dependent time series is challenging because the characteristics of the persistent dependence are difficult to isolate and estimate. The problems are compounded for time series that are both nonlinear and long-range dependent. This is the case for best-effort Internet traffic measurements. The apparent complexity is so great that 10 years of focused study had led to disparate, seemingly contradictory results. But we discovered that a new class of nonlinear long-range dependent time series models, which we call fractional sum-difference (FSD) models, mediate the contention in the world of Internet traffic research. The models, the first comprehensive modeling of Internet traffic, show that most previous results are correct, some with certain qualifications, and the models explain the seeming contradictions. They can also be used to generate open-loop background traffic for large-scale Internet simulations. It seems likely that FSD models might explain other time series as well. This work is joint with Jin Cao of Bell Labs.