Abstract

In this talk, we will give an overview of the difficulties of modeling complex networks such as an electric power grid. In any complex network, a useful model must represent the network behavior with as few parameters as possible. In most practical applications, the behavior of the network is represented as a signal. For example, in low-voltage electric power lines, the signal may be the outlet voltage as a function of time. Therefore, the question of sparse representation of signals is important, and very relevant to the communication of information in such complex networks.

We will provide a brief introduction to the applied mathematics related to sparse representation of signals and their applications in inverse problems. We will demonstrate the approach by applying a sparse representation of the transients to a detection problem. We will also discuss formulation of a sparse model representation and communication using the appropriate optimization framework. We will demonstrate this formulation and approach using the detection problem in communication and we will show how the result depends on the transform and optimization criterion.

This talk is targeted to build collaboration among other researchers on campus who may be interested in sparse signal representation. The talk should be accessible to graduate students.

Biography of Speaker

Taufiquar Khan is an Associate Professor in the Department of Mathematical Sciences. He joined Clemson University after receiving his PhD in applied mathematics at the University of Southern California in 2000. His research area is in mathematical modeling, simulation, and analysis of smart grid power system, inverse problems involving partial differential equations and infinite dimensional systems, with particular emphasis on model parameter estimation with applications to biomedical imaging and sparse representation of signals in modeling and communication of complex networks. Throughout his career, he has been involved with research projects funded through the Air Force, Humboldt Foundation, ITRON Inc., NASA, NSF, and TRW.