

# Abstract

## **Complex Dynamical System: Analysis and Control via Linear Matrix Inequality (LMI) techniques.**

To analyze/predict the behavior of system at a future time is always a topic of interest not only in engineering or physics but in every subject (like Economics, Psychology, Finance etc) and thus it is a topic of research to systems and control community too. For understanding the behavior of a system one need to have a dynamical model, but modeling should be such that it must predict more realistic nature/behavior without many complications in the models too. More complex is the model more complex will be the mathematical framework for carrying out the analysis and further control synthesis of the system under study. Thus there is always a tradeoff between the complexity of the model of the system and framework of analysis.

In this talk few important features of the systems will be considered to create a model of the complex dynamical system in an attempt to obtain/predict more realistic situation of the response. One such feature is delays in the system dynamics along with consideration of parametric uncertainties, hard and smooth nonlinearities thereby making the system model more realistic but bit more complexes. The modeling is oriented in such a way that analytical framework remains easier, tractable and further control development becomes straight forward. Thus this talk will cover comprehensive analysis and control design for such system using established LMI (Linear Matrix Inequality) approach.

This talk will further focus on solution of certain interesting complex systems from electric power networks, bio-medical engineering, fuzzy and neural-network dynamical systems as case studies.