

## **CCEC Seminar**

# **Exploring the Maximum Capability of Feedback in Dealing with Uncertainties**

**Professor Lei Guo**

*President of the Chinese Academy of Mathematics and Systems Science*

**Thursday, April 14th, 2005**

**10:00 - 11:00 am**

**Engineering II Pavillion**

### **ABSTRACT:**

To explore the maximum capability and potential limits of the feedback mechanism, we have to work in a framework that is somewhat beyond those of the classical ones (including robust and adaptive control), since we need to study the full capability of the feedback mechanism which includes all (nonlinear and time-varying) causal mappings, that are not restricted to a fixed feedback law or a set of specific feedback laws. We need not only to answer what the feedback can do, but also to answer, the more difficult question, what the feedback cannot do. In this seminar, we will present several concrete results towards understanding the capability (and limits) of the feedback mechanism in dealing with structural uncertainties. In particular, for several basic classes of uncertain nonlinear discrete-time (or sampled-data) dynamical control systems, some “Critical Values” and “Impossibility Theorems” concerning the capability of feedback will be presented.

### **About the Speaker:**

Professor Guo is a leading researcher in stochastic and adaptive control and author of several books on identification and stochastic gradient methods. Professor Lei Guo received the Ph.D. degree in control theory from the Chinese Academy of Sciences in 1987. He was a postdoctoral fellow at the Australian National University, and a visiting professor at several universities in the US and Europe. Dr. Guo is a Fellow of IEEE and the recipient of the 1993 IFAC World Congress Young Author Prize. In 2001 he was elected to the Chinese Academy of Sciences and is currently President of its Mathematics and System Science division.