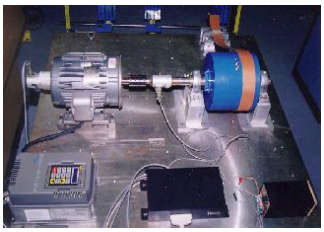
# Modeling and Control
## Chairs: Richard Klafter, Imre Rudas

**A New Data Fusion Method and its Application to State Estimation of Nonlinear Dynamic Systems**
Jae-Won Lee and Sukhan Lee
Samsung Advanced Institute of Technology

**Non-Conventional Integration of the Fundamental Elements of Soft Computing and Traditional Methods in Adaptive Robot Control**
I. J. Rudas, J. K. Tar, J. F. Bito and K. Kozlowski
Bnki Dont Polytechnic

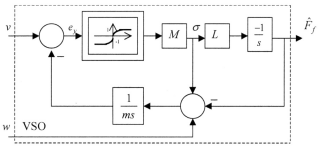
**Advanced Torque Control of Robot Manipulators Driven by AC Induction Motors**
Dong Sun and James K. Mills
University of Toronto

- Demand for the design of a feasible control method for AC induction motors which can exhibit better motion performance than PID.
- A torque feed-forward plus a PI-type torque feedback control.
- The implementation is greatly simplified through linearization of the torque dynamics while making partial compensation via current feedback and flux estimation.
- Experiments conducted on a commercial AC induction servo system demonstrate the effectiveness of the proposed torque control method.



**Variable Structure Systems Approach to Friction Estimation and Compensation**
Q. P. Ha, A. Bonchis, D. C. Rye and H. F. Durrant-Whyte
The University of Sydney

- Using a VSS-based technique in designing observers for friction estimation and compensation
- Model-based approach: VSO for friction compensation with and without velocity information
- Non model-based approach: Friction cancellation with a robust sliding mode controller
- Robustness verified with friction of both static and dynamic types




$$\dot{\hat{F}}_f = -L\sigma,$$
$$\dot{\hat{y}} = (-\hat{F}_f + w + \sigma)/m,$$
$$\sigma = M\tanh(e_y/\gamma_{e_y})$$

**Stabilization of A Gyroscopically Stabilized Robot on an Inclined Plane**
Yangsheng Xu and Loi Wah Sun
The Chinese University of Hong Kong

- Develop a control system for a gyroscopically stabilized robot on an inclined plane
- Develop a complete dynamic model
- Study its stabilization on inclined plane
- Propose the backstepping control for trajectory tracking and stabilization

**Fuzzy Logic Based Optimization for Manipulators**
M. C. Ramos and A. J. Koivo
Purdue University