High-Speed Motion Control for Robots
Peter H. Meckl, Calvin Nho, Wit Chatlatanagulchai

• Problem: Nonlinearities make high-speed tracking difficult.
• Solution: Develop a nonlinear control structure that learns the robot dynamics during motion.
High-Speed Motion Control for Wire Bonder
Peter H. Meckl, Deepak Agarwal, Kamran Gul

- Problem: Z-axis trajectory must allow wire to follow a specific path for strain relief without causing vibration at the bond.
- Solution: Design a time-optimal motion profile that follows the desired wire trajectory and minimizes excitation of resonances.
Precision Control of Piezoelectric Actuators for Scanning Microscopes
Peter H. Meckl, Yongkai Xu

- **Problem**: Achieve fast turn-around without detrimental vibration.
- **Solution**: Shape transition profile to minimize time & vibration.

![Diagram of scan trajectory and position/velocity graphs](image)
Diagnosing Engine Health with Information-Rich Inputs

Peter H. Meckl, Galen B. King, Alok Joshi, Paul Deignan
Cummins, Inc.

- **Problem**: Diagnosing faults in engines using few sensor signals
- **Solution**: Evaluate importance of each signal on engine health using the metric of mutual information; choose most informative sensor set and generate cross-plots; identify data clusters and quantify how these move with fault conditions.