

# Publications

## I. BOOKS AUTHORED

1. K.S. Tsakalis and P.A. Ioannou, *Linear Time-Varying Systems: Control and Adaptation*, Prentice-Hall, Englewood Cliffs, New Jersey, 1993.

## II. REFEREED JOURNAL PAPERS

1. L.D. Iasemidis, **W. Chaovalitwongse**, **D.-S. Shiau**, **A. Prasad**, **B. Veeramani**, J.C. Sackellares, P.M. Pardalos, P.R. Carney, and K. Tsakalis, "Adaptive Epileptic Seizure Prediction System," *IEEE Transactions on Biomedical Engineering*, Jan. 2003 (to appear).
2. K. Tsakalis, S. Dash, A. Green and W. MacArthur, "Loop-shaping controller design from input-output data: application to a paper machine simulator," *IEEE Transactions on Control Systems Technology*, Vol. 10, No. 1, 127-136, Jan. 2002.
3. **E. Grassi**, K. Tsakalis, S. Dash, S.V. Gaikwad, W. MacArthur and G. Stein, "Integrated Identification and PID Controller Tuning by Frequency Loop-Shaping," *IEEE Trans. Contr. Systems Technology*, 9, 2, 285-294, March 2001.
4. **Suttipan Limanond** and K.S. Tsakalis, "Adaptive and non-adaptive 'pole-placement' control of multivariable linear time-varying plants," *Int. J. Control*, 74, 5, 507-523, 2001.
5. **Suttipan Limanond** and K.S. Tsakalis, "Model Reference Adaptive and Nonadaptive Control of Linear Time-Varying Plants," *IEEE Trans. Automat. Contr.*, 45, 7, 1290-1300, July 2000.
6. **E. Grassi** and K. Tsakalis, "PID Controller Tuning by Frequency Loop-Shaping: Application to Diffusion Furnace Temperature Control," *IEEE Trans. Contr. Systems Technology*, 8, 5, 842-847, Sept. 2000.
7. **M. Beaudoin**, **E. Grassi**, S.R. Johnson, **K. Ramaswamy**, K. Tsakalis, T.L. Alford and Y.H. Zhang, "Real-time composition control of InAlAs grown on InP using spectroscopic ellipsometry," *J. Vac. Sci. Technol. B* 18(3), pp. 1435-1438, May/June 2000.
8. **Elena Grassi**, Shane R. Johnson, **Mario Beaudoin**, and Kostas S. Tsakalis, "Temperature-composition determination based on modeling of optical constants of III-V compound semiconductors measured by spectroscopic ellipsometry," *J. Vac. Sci. Technol. B* 17(3), pp. 1223-1226, May/June 1999.
9. S.R. Johnson, **E. Grassi**, **M. Beaudoin**, **M.D. Boonzaayer**, K.S. Tsakalis, and Y.H. Zhang, "Closed-loop control of composition and temperature during the growth of InGaAs lattice matched to InP," *J. Vac. Sci. Technol. B* 17(3), pp. 1237-1240, May/June 1999.
10. S.R. Johnson, **E. Grassi**, **M. Beaudoin**, **M.D. Boonzaayer**, K.S. Tsakalis, Y.H. Zhang, "Feedback control of substrate temperature during the growth of near-lattice-matched InGaAs on InP using diffuse reflection spectroscopy," *Journal of Crystal Growth*, 201/202, pp. 40-44, 1999.
11. **E. Grassi**, S.R. Johnson, **M. Beaudoin**, K.S. Tsakalis, "Modeling of optical constants of InGaAs and InAlAs measured by spectroscopic ellipsometry," *Journal of Crystal Growth*, 201/202, pp. 1081-1084, 1999.
12. M. Yelverton, K. Tsakalis and K. Stoddard, "Factory-wide run-to-run process control," *Solid State Technology*, pp. 45-52, Dec. 1999.

13. **S. Limanond**, J. Si and K.S. Tsakalis, "Monitoring and Control of Semiconductor Manufacturing Processes," *IEEE Control Systems*, V. 18, 6, 46-58, Dec. 1998.
14. K.S. Tsakalis, "Bursting Scenaria in Adaptive Algorithms: Performance Limitations and Some Remedies," *Kybernetika*, 33, 1, 17-40, 1997.
15. K.S. Tsakalis, "Performance Limitations of Adaptive Parameter Estimation and System Identification Algorithms in the Absence of Excitation," *Automatica*, 32, 4, 549-560, 1996.
16. K.S. Tsakalis, **M. Deisher** and A. Spanias, "System Identification Based on Bounded Error Constraints," *IEEE Trans. Signal Proc.*, 43, 12, 3071-3075, Dec. 1995.
17. K.S. Tsakalis and **Suttipan Limanond**, "Asymptotic Performance Guarantees in Adaptive Control," *Int. J. of Adaptive Control and Signal Processing*, Vol. 8, 173-199, 1994.
18. K.S. Tsakalis, "Adaptive Control of Linear Time-Varying Plants: The Case of "Jump" Parameter Variations," *Int. Journal of Control* Vol. 56, No. 6, pp. 1299-1345, 1992.
19. K.S. Tsakalis, "Robustness of Model Reference Adaptive Controllers: An Input-Output Approach," *IEEE Trans. Automat. Contr.*, Vol. 37, No. 5, pp. 556-565, May 1992.
20. K.S. Tsakalis and P.A. Ioannou, "A New Indirect Adaptive Control Scheme for Time-Varying Plants," *IEEE Trans. Automat. Contr.*, AC-35, No. 6, pp. 697-705, June 1990.
21. K.S. Tsakalis and P.A. Ioannou, "Adaptive Control of Linear Time-Varying Plants: A New Model Reference Controller Structure," *IEEE Trans. Automat. Contr.*, AC-34, pp. 1038-1046, Oct. 1989.
22. K.S. Tsakalis and P.A. Ioannou, "Adaptive Control of Time-Varying Plants: Simple Examples," *Int. J. of Adaptive Control and Signal Processing*, Vol. 2, pp. 291-309, Dec. 1988.
23. K.S. Tsakalis and P.A. Ioannou, "Adaptive Control of Linear Time-Varying Plants," *Automatica*, Vol. 26, No. 4, pp. 459-468, July 1987.
24. P.A. Ioannou and K.S. Tsakalis, "A Robust Direct Adaptive Controller," *IEEE Trans. Automat. Contr.*, AC-31, No. 11, pp. 1033 - 1043, Nov. 1986.
25. K.S. Tsakalis, T.T. Tsotsis and G.J. Stiegel, "Deactivation Phenomena by Site Poisoning and Pore Blockage: The Effect of Catalyst Size, Pore Size and Pore Size Distribution," *Journal of Catalysis*, 88, pp. 188-202 July 1984.

### III. CHAPTERS IN BOOKS AUTHORED

1. P.A. Ioannou and K.S. Tsakalis, "Robust Discrete-Time Adaptive Control," in *Adaptive and Learning Systems: Theory and Applications*, Plenum Press, edited by K. S. Narendra, 1986.

### IV. PATENTS

1. K. Stoddard, J.B. Hugues, and K. Tsakalis, "Model Based Temperature Controller for Semiconductor Thermal Processors," *U.S. Patent No. 5,895,596*, April 20, 1999.
2. K. Stoddard, P.R. McHugh, and K. Tsakalis, "Temperature Control System for a Thermal Reactor," *U.S. Patent No. 6,207,937 B1*, March 27, 2001.
3. K. Stoddard, P.R. McHugh, and K. Tsakalis, "Temperature Control System for a Thermal Reactor," *U.S. Patent No. 6,211,495 B1*, April 3, 2001.

4. K. Stoddard, P.R. McHugh, and K. Tsakalis, "Temperature Control System for a Thermal Reactor," *U.S. Patent No. 6,222,164 B1*, April 24, 2001.
5. K. Stoddard, P.R. McHugh, and K. Tsakalis, "Temperature Control System for a Thermal Reactor," *U.S. Patent No. 6,441,350*, August 27, 2002.
6. S.V. Gaikwad, S.K. Dash, K.S. Tsakalis, and G. Stein, "Auto-tuning Controller using Loop-Shaping," *U.S. Patent Application Publication No. US2002/0040250 A1*, Apr. 4, 2002

## V. REFEREED CONFERENCE PAPERS

1. K. Tsakalis and Sachi Dash, "Simple criteria for controller performance monitoring," *Proc. ACC*, 4985-4987, Anchorage, AK, May 8-10, 2002. ACC 2002
2. **Ehsan Al-Dulaijan**, Kostas Tsakalis, Alf Green, and Sachi Dash, "Multivariable Controller Performance Monitoring via Robust Stability Conditions," *Proc. IEEE APC 2001 Workshop*, Industry Appl. Society, 3-8, Vancouver, Canada, May 2001.
3. K. Tsakalis, **J.-J. Flores-Godoy**, K. Stoddard and B. Mack "Multivariable Temperature Control of Magnetic Anneal Furnace," *Proc. IASTED Intl., Conf. MIC*, 6-11, Feb. 19-22, 2001, Innsbruck, Austria.
4. K. Tsakalis, **A. Papadopoulos**, K. Stoddard, "Run-to-Run Control: Using Dead-Zones to Improve Speed-Variance Trade-off," *Proc. IASTED Intl., Conf. MIC*, 131-135, Feb. 14-17, 2000, Innsbruck, Austria.
5. D. Collins, F. Golshani, F. Hoppensteadt, C. Ringhofer, J. Si, K. Tsakalis, "Interdisciplinary Research on Modeling and Scheduling of Semiconductor Manufacturing Operations," *ASEE2000*, Session 3647, St Louis, 2000.
6. D. Collins, J.-J. Flores-Godoy, F. Hoppensteadt, K. Tsakalis, "Minimum Inventory Variability Dispatching Policies - MIVP," *ASEE2000*, Session 2563, St Louis, 2000.
7. **E. Grassi**, K. Tsakalis, S. Dash, S. Gaikwad, G. Stein, "Adaptive/Self-Tuning PID Control by Frequency Loop-Shaping," *Proc. IEEE 39th Conf. Decision and Control*, V.2, 1099-1101, Sydney, Dec. 12-15, 2000.
8. K. Tsakalis, M. Yelverton, B. Cusson, K. Stoddard, B. Schulze, "Optimizing Diffusion Furnace Performance Using Run-To-Run Process Control," *SEMIPAC '99*, San Antonio, Jan. 24-27, 1999.
9. K. Tsakalis, M. Yelverton, B. Cusson, K. Stoddard, B. Schulze "Run-To-Run Control: Application To Oxidation Processes," *18th IASTED Int'l Conf. MIC'99*, 156-159, Innsbruck, Austria, Feb. 15-18, 1999.
10. **E. Grassi**, **R. Metzger**, S. Johnson, K. Tsakalis, Y.-H. Zhang and A. Rodriguez, "System Identification and Control for ASU's Molecular Beam Epitaxy (MBE) Machines," *Proc. American Contr. Conf.*, V.6, 4568-4572, San Diego, June 1999.
11. A. Green, K. Tsakalis, W. MacArthur, S. Dash, "Integrated Identification and Robust Control for Paper Machines," *Proc. American Contr. Conf.*, V.6, 3970-3974, San Diego, June 1999.
12. **S. Adusumilli**, S. Dash, D. Rivera and K. Tsakalis, "A Comparison of Identification-Based Performance Bounds for Robust Process Control," *Proc. IEEE Intl. Conf. on Contr. Applic.*, V.1, 594-599, Hawai, Aug. 1999.

13. **M. Beaudoin, E. Grassi, S. R. Johnson, K. Ramaswamy, K. Tsakalis, T. L. Alford and Y.-H. Zhang**, "Real-Time Composition Control of InAlAs Using Spectroscopic Ellipsometry," *North American Conference on Molecular Beam Epitaxy*, Banff AB, October 1999.
14. K. Tsakalis and K. Stoddard, "Control Oriented Uncertainty Estimation in System Identification," *IASTED MIC'98 Conf.*, Grindelwald, Feb. 98.
15. **S. Adusumilli, D.E. Rivera, S. Dash and K. Tsakalis**, "Integrated Identification and Robust PID Controller Design through Loop Shaping for Multi-Input Multi-Output Processes," *Proc. ACC*, V.2, 1230–1234, Jun. 98.
16. **J.J. Flores-Godoy, Y. Wang, D.W. Collins, F. Hoppensteadt and K. Tsakalis**, "A Mini-Fab Simulation Model comparing FIFO and MIVP schedule policies (outer loop) and PID and H-infinity machine controllers (inner loop) for semiconductor diffusion bay maintenance," *IECON'98, 24th Annual Conf.*, IEEE Indust. Elec. Soc., V.1, 253–258, Aachen, Sep. 98.
17. **E. Grassi, S. Johnson, M. Beaudoin and K. Tsakalis**, "Temperature-Composition Sensor Based on Modeling of Optical Constants of InGaAs and InAlAs Measured by Spectroscopic Ellipsometry," *Proc. Xth MBE SV Congress*, Cannes, Sep. 98.
18. S. Johnson, **E. Grassi, M. Beaudoin, M.D. Boonzaayer, Y.H. Zhang and K. Tsakalis**, "Feedback Control of Substrate Temperature During the Growth of Near-Lattice-Matched InGaAs on InP Using Diffuse Reflection Spectroscopy," *Proc. Xth MBE SV Congress*, Cannes, Sep. 98.
19. **E. Grassi, S. Johnson, M. Beaudoin, and K. Tsakalis**, "Temperature-composition sensor based on modeling of optical constants of III-V compound semiconductors measured by spectroscopic ellipsometry," *Proc. 17th North American Molecular Beam Epitaxy Conf.*, Pennsylvania, U.S.A., October 1998.
20. S. R. Johnson, **E. Grassi, M. Beaudoin, M. D. Boonzaayer, K.S. Tsakalis, and Y. H. Zhang**, "Closed-loop control of composition and temperature during the growth of InGaAs lattice matched to InP," *Proc. 17th North American Molecular Beam Epitaxy Conf.*, Pennsylvania, U.S.A., October 1998.
21. **K.S. Jun, D.E. Rivera, K.S. Tsakalis, H.M. Liaw, E. Hall, and C. Stein**, "PID Optimization for Temperature Control of Epitaxial Growth," *Proc. ECS Conference*, 373–374, Montreal, Feb. 1997.
22. **J.J. Kristoff, L.J. Song, K.S. Tsakalis and T.S. Cale**, "Optimally Controlled Programmed Rate Deposition of Tungsten," *VLSI Multilevel Interconnect Conference*, Santa Clara, CA, June 1997.
23. **J.J. Kristoff, L.J. Song, K.S. Tsakalis and T.S. Cale**, "Programmed Rate and Optimal Control Chemical Vapor Deposition of Tungsten," *1997 Joint Int. Meeting, ECS/ISEC*, Paris, France, Sept. 1997. June 1997.
24. K.S. Tsakalis, **J.J. Flores-Godoy** and A.A. Rodriguez, "Hierarchical Modeling and Control of Re-Entrant Semiconductor Fabrication Lines: A Mini-Fab Benchmark," *Proc. 6th IEEE Int. Conference on Emerging Technologies and Factory Automation*, 508–513, Los Angeles, Sept. 1997.
25. K.S. Tsakalis and K.D. Stoddard, "Integrated Identification and Control for Diffusion/CVD Furnaces" *Proc. 6th IEEE Int. Conference on Emerging Technologies and Factory Automation*, 514–519, Los Angeles, Sept. 1997.

26. **M.K. ElAdl**, A.A. Rodriguez and K.S. Tsakalis, "Hierarchical Modeling and Control of Re-Entrant Semiconductor Manufacturing Facilities," *Proc. 35th Conference on Decision and Control*, 1736–1742, Kobe, Japan, Dec. 1996.
27. **E. Grassi** and K.S. Tsakalis, "PID Controller Tuning by Frequency Loop-Shaping," *Proc. 35th Conference on Decision and Control*, 4776–4781, Kobe, Japan, Dec. 1996.
28. **L. Song**, **S. Shen**, K.S. Tsakalis, P.E. Crouch and T.S. Cale, "Optimal Control for Increasing Throughput in Low Pressure Chemical Vapor Deposition," *Proc. 35th Conference on Decision and Control*, 4831–4836, Kobe, Japan, Dec. 1996.
29. **C. Alexander** and K.S. Tsakalis, "Control of an Inverted Pendulum: A Classical Experiment Revisited," *Proc. of 1995 Soc. for Comp. Sim. Western Multi-Conference*, Las Vegas, NV, Jan. 1995.
30. T.S. Cale, P.E. Crouch, **L. Song** and K.S. Tsakalis, "Optimal Control for LPCVD," *Proc. Symposium on Process Control, Diagnostic and Modeling in Semiconductor Manufacturing*, The Electrochemical Society, Vol. 95-2, 97–107, Reno, May 1995.
31. T.S. Cale, P.E. Crouch, **L. Song** and K.S. Tsakalis, "Increasing Troughput in Low Pressure Chemical Vapor Deposition: An Optimal Control Approach," *Proc. ACC*, 1289–1293, Seattle, June 1995.
32. T.S. Cale, P.E. Crouch, **S. Shen** and K.S. Tsakalis, "A Simple Adaptive Optimization Algorithm for the Tungsten LPCVD Process," *Proc. ACC*, 1294–1298, Seattle, June 1995.
33. K.S. Tsakalis, "Bursting Scenaria and Performance Limitations of Adaptive Algorithms in the Absence of Excitation," *3rd IEEE Mediterranean Symposium on New Directions in Control and Automation*, Vol. 1, 256–264, Limassol, Cyprus, July 1995.
34. Peter E. Crouch, **Lijuan Song**, Kostas S. Tsakalis and Timothy S. Cale, "Optimal Control Processing to Increase Single Wafer Reactor Throughput In LPCVD," *Proc. Fourth IEEE/UCS/SEMI International Symposium on Semiconductor Manufacturing*, 233–238, Austin, Sept. 1995.
35. T.S. Cale, P.E. Crouch, **S. Shen** and K.S. Tsakalis, "Run-to-Run Adaptive Optimization of a Tungsten Silicide LPCVD Process," *Proc. 34th CDC*, V.3, 2474–2475, New Orleans, Dec. 1995.
36. K.S. Tsakalis, "Performance Limitations of Adaptive Parameter Estimation and System Identification Algorithms in the Absence of Excitation," *Proc. American Control Conference*, 1260–1264, Baltimore, 1994.
37. **S. Limanond** and K.S. Tsakalis, "Adaptive and non-Adaptive "Pole-Placement" Control of Multivariable Linear Time-Varying Plants," *Proc. American Control Conference*, 455–459, Baltimore, 1994.
38. **K.D. Stoddard**, P.E. Crouch, M. Kozicki and K.S. Tsakalis, "Application of Feed-Forward and Adaptive Feedback Control to Semiconductor Device Manufacturing," *Proc. American Control Conference*, 892–896, Baltimore, 1994.
39. K.S. Tsakalis and **L. Song**, "Set-Membership Estimation for Weakly Nonlinear Models: An Application to the Adaptive Control of Semiconductor Manufacturing Processes," *Proc. 33rd CDC*, 1066–1071, Lake Buena Vista, 1994.

40. **S. Limanond** and K.S. Tsakalis, "Model Reference Adaptive and non-Adaptive Control of Multivariable Linear Time-Varying Plants: The Exact Matching Case," *Proc. 32nd CDC*, 3072–3077, San Antonio, Dec. 1993.
41. K.S. Tsakalis and **S. Limanond**, "On Certain Performance Issues Arising in Adaptive Control," *Proc. ACC*, San Francisco, June 1993.
42. K. S. Tsakalis and P. E. Crouch, "A Simple Adaptive Controller for an Oxidation Process," *Proc. ACC*, Chicago 1992.
43. K. S. Tsakalis, **M. Deisher** and A. Spanias, "Adaptive FIR Filtering Based on Bounded Error Constraints," *Proc. 26th Asilomar Conference on Signals, Systems and Computers*, V.1, 15–19, Oct. 1992.
44. K. S. Tsakalis and **S. Limanond**, "Adaptive Control of Time-Varying Systems: An Application to the Attitude-Momentum Control of the Space Station," *Proc. 31st CDC*, 1285–1286, Tucson, Dec. 1992.
45. K. S. Tsakalis, "Adaptive Control of Linear Time-Varying Plants: The Case of "Jump" Parameter Variations," *Proc. ACC*, 1235–1236, Boston, June 1991.
46. K. S. Tsakalis and P. A. Ioannou, "Adaptive Control of Linear Time-Varying Plants: A New Controller Structure," in *Proc. ACC*, 583–588, Minneapolis, 1987.
47. K. S. Tsakalis and P. A. Ioannou, "On the Model Reference Adaptive Control of Time-Varying Plants," in *Proc. 26th CDC*, 354–359, Los Angeles, 1987.
48. K. S. Tsakalis and P. A. Ioannou, "Adaptive Control of Linear Time-Varying Plants," *Proc. 2nd IFAC Workshop on Adaptive Systems in Control and Signal Processing*, 233–238, Lund, 1986.
49. P. A. Ioannou and K. S. Tsakalis, "A Robust Discrete-Time Adaptive Controller," *Proc. 25th CDC*, 838–843, Athens, Greece, 1986.

## VI. INVITED CONFERENCE PAPERS AND PRESENTATIONS

1. (I) K. Tsakalis, **A. Papadopoulos** and K. Stoddard, "The Role of Dead-Zones in Improving Run-to-Run Control Performance," Sematech's AEC/APC Symposium XI, Vail CO, Oct. 1999.
2. (I) A. Green, K. Tsakalis, W. MacArthur, S. Dash, "Control-Oriented Identification and Uncertainty Estimation for Paper Machines," *Proc. 1999 International Conference on Acoustics, Speech, and Signal Processing.*, V.4, 2279–2282, Phoenix, May 1999.
3. (I) K. Tsakalis, **J.-J. Flores-Godoy** and K. Stoddard, "Temperature Control of Diffusion/CVD Furnaces Using Robust Multivariable Loop-Shaping Techniques," *Proc. 38th Conf. Decision and Contr.*, V.4, 4192–4197, Phoenix, AZ, Dec. 1999.
4. (I) K. Tsakalis, and S. Dash, "Loop-Shaping Controller Design from Input-Output Data," *Proc. 38th Conf. Decision and Contr.*, V.2, 1511–1516, Phoenix, AZ, Dec. 1999.
5. (I) **E. Grassi**, K. Tsakalis, S. Dash, S. Gaikwad, W. MacArthur and G. Stein, "Integrated System Identification and PID Controller Tuning by Frequency Loop-Shaping," *Proc. 38th Conf. Decision and Contr.*, V.2, 1517–1522, Phoenix, AZ, Dec. 1999.
6. (I) M. Tucker, E. Valdez, K. Tsakalis, M. Warren and K. Stoddard, "Improving Vertical Furnace Performance Using Model-Based Temperature Control," AEC/APC Symposium X, Vail CO, Oct. 1998.

7. (I) K.S. Tsakalis, "Control and Identification of Linear Time-Varying Plants Using I/O Methods," *Proc. 34th Conference on Decision and Control*, 2527–2532, New Orleans, Dec. 1995.
8. (I) P.E. Crouch, T.S. Cale, **S. Shen, L. Song** and K.S. Tsakalis, "Optimal Control for LPCVD Processes," *Proc. 7th Sematech AEC and APC Workshop*, New Orleans, Nov. 1995.
9. (I) K.S. Tsakalis, "On the Identification and Control of Linear Time-Varying Systems," *Proc. 1993 ACC*, San Francisco, June 1993.
10. (I) K.S. Tsakalis and P.E. Crouch, "A Simple Adaptive Controller for an Oxidation Process," presented at the *NSF-Washington University Workshop on Nonlinear Control*, St. Louis, May 1992.
11. (I) K. S. Tsakalis, "The  $\sigma$ -modification in the Adaptive Control of Linear Time-Varying Plants," *Proc. 31st CDC*, 694–698, Tucson, Dec. 1992.
12. (I) K. S. Tsakalis, "Robustness of Model Reference Adaptive Controllers: Input-Output Properties," *Proc. 28th CDC*, 1025–1030, Tampa, Dec. 1989.
13. (I) K. S. Tsakalis and P. A. Ioannou, "Parameter Estimation and Pole-Placement Control of Time-Varying Plants," in *Proc. ACC*, 1636-1641, Atlanta, 1988.
14. (I) P. A. Ioannou and K. S. Tsakalis, "The Class of Unmodeled Dynamics in Robust Adaptive Control," in *Proc. ACC*, 337–342, Atlanta, 1988.
15. (I) K. S. Tsakalis and P. A. Ioannou, "A New Indirect Adaptive Control Scheme for Time-Varying Plants," in *Proc. 27th CDC*, 2419–2424, Austin, Dec. 1988.

# Student Theses and Dissertations

## Masters Theses Awarded

1. Kaushik Bhatt; (MS Dec. 2002) Performance Monitoring of Controllers.
2. Aris Papadopoulos; (MS Dec. 2002) Swinging up the Inverted Pendulum by Energy Adaptive Proportional-Integral-Derivative Control.
3. J. Kristof, (MS May 00, with T. Cale) Optimal programmed rate chemical vapor deposition of tungsten.
4. J. Frigo, (MS Dec. 96) An analog neural network control method proposed for use in spacecraft systems.
5. C. Alexander, (MS May 95) System modeling and control of an inverted pendulum: an input-output approach.
6. K. Stoddard, (MS Sep. 94 with P. Crouch and M. Kozicki), Application of feedforward and adaptive feedback control to semiconductor device processing.
7. C.C. Kok, (MS May 93) Application of neural network in the control of an oxidation process
8. Y.N. Liao, (MS-MAE May 92) Constrained parameter estimation in model reference adaptive control.
9. S. Limanond, (MS Dec. 91) Decentralized adaptive linear quadratic control for time-varying systems.

## Doctoral Dissertations Awarded

1. Jose-Job Flores-Godoy; (PhD Dec. 2002), Nonlinear identification for diffusion/Chemical Vapor Deposition furnaces.
2. E. Grassi, (PhD Dec. 99), Proportional-integral-derivative controller tuning by frequency loop-shaping.
3. G. Nair, (PhD Apr. 98, with A. Spanias) Fast adaptive algorithms using eigenspace projections.
4. L. Song, (PhD May 97) Optimal control problems in chemical vapor deposition.
5. A. Abdalla, (PhD May 96), Control of linear time-varying systems.
6. S. Limanond, (PhD Aug. 94) Adaptive and non-adaptive control of multivariable linear time-varying plants.