

CURRICULUM VITAE

Hassan K. Khalil

Department of Electrical and Computer Engineering

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Education Ph.D. (1978), University of Illinois (P.V. Kokotovic, thesis advisor), M.S. (1975) and B.S. (1973), Cairo University.

Professional Experience

- 2003 – University Distinguished Professor, Electrical and Computer Eng., MSU
- 1987 – 2003 Professor, Electrical and Computer Engineering, MSU
- 1983 – 1987 Associate Professor, Electrical Engineering, MSU
- 1978 – 1983 Assistant Professor, Electrical Engineering, MSU
- 1975 – 1978 Research Assistant, Electrical Engineering, Univ. of Illinois, Urbana
- 1973 – 1975 Teaching Assistant, Electronics and Communication, Cairo Univ.

Research Interest

Nonlinear Control; Singular Perturbation Theory

Honors

- Fellow of the Institute of Electrical and Electronics Engineers (IEEE), 1989, for contributions to singular perturbation theory and its application to control.
- Fellow of the International Federation of Automatic Control (IFAC), 2007, for contribution to singular perturbation theory, nonlinear feedback control and control education.
- George S. Axelby Outstanding Paper Award, IEEE Control Systems Society, 1989.
- John R. Ragazzini Education Award, American Automatic Control Council, 2000.
- Control Engineering Textbook Prize, IFAC, 2002.
- O. Hugo Schuck Best Paper Award, American Control Conference, 2004.
- AGEF Faculty Mentor of the Year Award, 2009.
- The Journal Dynamics of Continuous, Discrete & Impulsive Systems published two special issues in December 2010 in honor of Professor Hassan K. Khalil's 60th birthday. One issue is under series A: Mathematical Analysis and the other under series B: Applications & Algorithms.
- Bode Lecture Prize, IEEE Control Systems Society, 2015

Honors (Michigan State University)

- Teacher Scholar Award, 1983.
- Withrow Distinguished Scholar Award, College of Engineering, 1994.
- Distinguished Faculty Award, 1995.
- University Distinguished Professor, 2003.

Technical and Professional Activities

- Associate Editor of IEEE Transactions on Automatic Control, 1984 - 1985, Automatica, 1992 – 1999, and Neural Networks, 1997-1998; Editor of Automatica, 1999 – 2008.
- Active in the organization of the IEEE-CDC Conference and the American Control Conference (ACC), including service as Program Chair of the 1988 ACC and General Chair of the 1994 ACC.

Industrial Consulting

- General Motors Research Laboratories, 1984 – 1988.
- Delco Products (GM), 1989–1991.
- General Motors R&D Center, 1993–1994.

Research Projects Funded by External Agencies

- Continuous funding from the National Science Foundation from 1979 to 2017. Topics include singular perturbations, decentralized control, feedback control of multiple time scale systems, nonlinear output feedback control: performance and robustness, and High-Gain Observers in Nonlinear Feedback Control.
- A contract with the U.S. Department of Energy from 1980 to 1983 on multimodel strategies for stochastic models.
- Funding from Ford Motor Company (with E. Strangas) from 1995 to 2001. Topics include robust AC motor control with minimal sensor requirements and fault diagnosis for DC distribution systems.
- A combined research curriculum development grant from the National Science Foundation from 1997 to 2000 (with F. Salam, C. Radcliffe, S. Shaw, and R.L. Tummala) on real-time sensing and control computing for automotive systems. The main goal of the grant is the development of a pilot senior-level course on automotive control which incorporates advanced nonlinear and intelligent control tools.

- Funding from the National Science Foundation from 2008 to 2011 (with X. Tan) on nonlinear and adaptive control of smart material-actuated systems with application to nanopositioning.
- Funding from National Science Foundation from from 2015 to 2018 (with R. Mukherjee) on impulsive control of underactuated mechanical systems.

Ph.D. Students

- Mohamed Gamal El-Ansary, 1983; professor, California State University, Bakersfield.
- Ali Saberi, 1983; professor, Washington State University; Fellow of IEEE and author of three research monographs.
- Douglas William Luse, 1983; industrial engineer, USA.
- Bakhtiar Litkouhi, 1984; senior staff engineer, General Motors R&D Center.
- Zoran Gajic, 1984; professor, Rutgers University; author of three research monographs and two textbooks.
- Yung-Nan Hu, 1986; associate professor, Da Yeh University, Taiwan.
- Rabah Wasel Aldhaheeri, 1988; professor, King Abdul-Aziz University, Saudi Arabia.
- Farzad Esfandiari, 1990; engineer, Motorola, USA.
- Fu-Chuang Chen, 1990; associate professor, National Chiao Tung University, Taiwan.
- Seungrohk Oh, 1994; associate professor, Dankook University, Korea.
- Nazmi A. Mahmoud, 1994; engineer, Chrysler, USA.
- Ahmed Nazir Atassi, 1999.
- Bader Aloliwi, 1999, assistant professor, Saudi Arabia.
- Ahmed M. Dabroom, 2000, assistant professor, Saudi Arabia.
- Hyon Sok Kay, 2003; engineer, Samsung, Korea.
- Sridhar Seshagiri, 2003; associate professor, San Diego State University.
- Leonid Freidovich, 2005; assistant professor; University of Umea, Sweden
- Jeff Ahrens, 2006; engineer, Corning, USA
- Attaullah Memon, 2009; assistant professor, NUST, Pakistan

- Shahid Nazrula, 2010; engineer, Chrysler, USA
- Alexis Prasov, 2011; researcher, MIT Lincoln Lab
- Mohamed Edardar, 2013; assistant professor, Lybia
- AlMuatazbellah M. Boker, 2013, assistant professor, Marshall University, USA
- Joonho Lee, 2014, research engineer, HRL Laboratories, USA

Books

- P.V. Kokotovic, H.K. Khalil and J. O'Reilly, *Singular Perturbation Methods in Control: Analysis and Design*. Academic Press, 1986. Republished by SIAM under the Classics in Applied Mathematics series, 1999.
- H.K. Khalil, *Nonlinear Systems*. Macmillan, 1992; Prentice Hall, 1996 (second edition), 2002 (third edition). The second edition received the IFAC Control Engineering Textbook Award, 2002.
- H.K. Khalil, *Nonlinear Control*. Pearson Education, 2015.
- H.K. Khalil, *High-Gain Observers in Nonlinear Feedback Control*. SIAM, 2017.
- P.V. Kokotovic and H. K. Khalil, Editors, *Singular Perturbation in Systems and Control*. IEEE Press, 1986.
- H. Khalil, J. Chow and P. Ioannou, Editors, *Proceedings of Workshop on Advances in Control and its Applications*. Springer-Verlag, 1996.

Technical Publications (Refereed Journals)

1. H.K. Khalil. Control of linear singularly perturbed systems with colored noise disturbance. *Automatica*, 14, 153–156, 1978.
2. H.K. Khalil and P.V. Kokotovic. Control strategies for decision makers using different models of the same system. *IEEE Trans. Automat. Contr.*, AC-23, 289–298, 1978.
3. H.K. Khalil and P.V. Kokotovic. D-stability and multiparameter singular perturbation. *SIAM J. Control and Optimization*, 17, 56–65, 1979.
4. H.K. Khalil and P.V. Kokotovic. Control of linear systems with multiparameter singular perturbations. *Automatica*, 15, 197–207, 1979.
5. H.K. Khalil and P.V. Kokotovic. Feedback and well-posedness of singularly perturbed Nash games. *IEEE Trans. Automat. Contr.*, AC-24, 699–708, 1979.
6. H.K. Khalil. Stabilization of multiparameter singularly perturbed systems, *IEEE Trans. Automat. Contr.* AC-24, 790–791, 1979.

7. H.K. Khalil and J. Medanic. Closed-loop Stackelberg strategies for singularly perturbed linear quadratic problems. *IEEE Trans. Automat. Contr.*, AC-25, 66–71, 1980.
8. H.K. Khalil. Approximation of Nash strategies. *IEEE Trans. Automat. Contr.*, AC-25, 247–250, 1980.
9. H.K. Khalil and P.V. Kokotovic. Decentralized stabilization of systems with slow and fast modes. *J. Large Scale Systems*, 1, 141–148, 1980.
10. H.K. Khalil. A new test for D-stability. *J. Economic Theory*, 23, 120–122, 1980.
11. H.K. Khalil. Multimodel design of a Nash strategy. *J. Optimization Theory and Applications*, 31, 553–564, 1980.
12. H.K. Khalil. On the robustness of output feedback control methods to modeling errors. *IEEE Trans. Automat. Contr.*, AC-26, 524–526, 1981.
13. H.K. Khalil. Asymptotic stability of nonlinear multiparameter singularly perturbed systems. *Automatica*, 17, 797–804, 1981.
14. H.K. Khalil. On the existence of positive diagonal P such that $PA + AP < 0$. *IEEE Trans. Automat. Contr.*, AC-27, 181–184, 1982.
15. H.K. Khalil and A. Saberi. Decentralized stabilization of nonlinear interconnected systems using high-gain feedback. *IEEE Trans. Automat. Contr.*, AC-17, 265–268, 1982.
16. A. Saberi and H.K. Khalil. Decentralized stabilization of a class of nonlinear interconnected systems. *Int. J. Control*, 36, 803–818, 1982.
17. B. Litkouhi and H K. Khalil. Infinite-time regulators for singularly perturbed difference equations. *Int. J. Control*, 39, 587–598, 1984.
18. A. Saberi and H.K. Khalil. Quadratic-type Lyapunov functions for singularly perturbed systems. *IEEE Trans. Automat. Contr.*, AC-29, 542–552, 1984.
19. H.K. Khalil and Z. Gajic. Near-optimum regulators for stochastic linear singularly perturbed systems. *IEEE Trans. Automat. Contr.*, AC-29, 531–541, 1984.
20. H.K. Khalil. A further note on the robustness of output feedback control methods to modeling errors. *IEEE Trans. Automat. Contr.*, AC-29, 861–862, 1984.
21. H.K. Khalil. Time scale decomposition of linear implicit singularly perturbed systems. *IEEE Trans. Automat. Contr.*, AC-29, 1054–1056, 1984.
22. A. Saberi and H.K. Khalil. An initial value theorem for nonlinear singularly perturbed systems. *Systems and Control Letters*, 4, 301–305, 1984.

23. A. Saberi and H.K. Khalil. Decentralized stabilization of interconnected systems using output feedback. *Int. J. Control*, 41, 1461–1475, 1985.
24. B. Litkouhi and H K. Khalil. Multirate and composite control of two-time-scale discrete-time systems. *IEEE Trans. Automat. Contr.*, AC-30, 645–651, 1985.
25. A. Saberi and H.K. Khalil. Stabilization and regulation of nonlinear singularly perturbed systems-composite control. *IEEE Trans. Automat. Contr.*, AC-30, 739–747, 1985.
26. D.W. Luse and H.K. Khalil. Frequency domain results for systems with slow and fast dynamics. *IEEE Trans. Automat. Contr.*, AC-30, 1171–1178, 1985.
27. M. El-Ansary and H.K. Khalil. On the interplay of singular perturbations and wide-band stochastic fluctuations. *SIAM J. on Control and Optimization*, 24, 83–94, 1986.
28. Z. Gajic and H.K. Khalil. Multimodel strategies under random disturbances and imperfect partial observations. *Automatica*, 22, Jan. 1986.
29. H.K. Khalil. Stability analysis of nonlinear multiparameter singularly perturbed systems. *IEEE Trans. Automat. Contr.*, AC-32, 260–263, 1987.
30. H.K. Khalil. Output feedback control of linear two-time-scale systems. *IEEE Trans. Automat. Contr.*, AC-32, 784–792, 1987.
31. H.K. Khalil and A. Saberi. Adaptive stabilization of a class of nonlinear systems using high-gain feedback. *IEEE Trans. Automat. Contr.*, AC-32, 1031–1035, 1987.
32. H.K. Khalil and Y.-N. Hu. Steering control of singularly perturbed systems: a composite control approach. *Automatica.*, vol. 25, pp. 65–75, 1989.
33. R.W. Aldhaferi and H.K. Khalil. A Real Schur form method for modeling singularly perturbed systems. *IEEE Trans. Automat. Contr.*, vol. 34, 856–861, 1989.
34. F. Esfandiari and H.K. Khalil. On the robustness of sampled-data control to unmodeled high-frequency dynamics. *IEEE Trans. Automat. Contr.*, vol. 34, 900–903, 1989.
35. H.K. Khalil. Feedback control of nonstandard singularly perturbed systems. *IEEE Trans. Automat. Contr.*, vol. 34, 1052–1060, 1989.
36. F.-C. Chen and H.K. Khalil. Two-time-scale longitudinal control of airplanes using singular perturbation. *AIAA J. on Guidance, Control, and Dynamics*, vol. 13, 952–960, 1990.
37. H.K. Khalil and P.V. Kokotovic. On stability properties of nonlinear systems with slowly-varying inputs. *IEEE Trans. Automat. Contr.*, vol. 36, 229, 1991

38. R.W. Aldhaheri and H.K. Khalil. Aggregation of the policy iteration method for nearly completely decomposable Markov chains. *IEEE Trans. Automat. Contr.*, vol. 36, 178–187, 1991.
39. F. Esfandiari and H.K. Khalil. On continuous approximations to variable structure control. *IEEE Trans. Automat. Contr.*, vol. 36, 616–620, 1991.
40. F.-C. Chen and H.K. Khalil. Adaptive control of nonlinear systems using neural networks. *Int. J. Control*, vol. 55, 1299–1317, 1992.
41. F. Esfandiari and H.K. Khalil. Output feedback stabilization of fully linearizable systems. *Int. J. Control*, vol. 56, 1007–1037, 1992.
42. H.K. Khalil and F.-C. Chen. H-infinity control of two-time-scale systems. *Systems and Control Letters*, vol. 19, 35–42, 1992.
43. H.K. Khalil and F. Esfandiari. Semiglobal stabilization of a class of nonlinear systems using output feedback. *IEEE Trans. Automat. Contr.*, vol. 38, 1412–1415, 1993.
44. H.K. Khalil. Robust servomechanism output feedback controllers for feedback linearizable systems. *Automatica*, vol. 30, 1587–1599, 1994.
45. F.-C. Chen and H.K. Khalil. Adaptive control of a class of nonlinear discrete-time systems using neural networks. *IEEE Trans. Automat. Contr.* vol. 40, 791–801, 1995.
46. S. Oh and H.K. Khalil. Output feedback stabilization using variable structure control. *Int. J. Control*, vol. 62, 831–848, 1995.
47. H.K. Khalil. Adaptive output feedback control of nonlinear systems represented by input-output models. *IEEE Trans. Automat. Contr.*, vol. 41, 177–188, 1996.
48. H.K. Khalil and E.G. Strangas. Robust speed control of induction motors using position and current measurements. *IEEE Trans. Automat. Contr.*, vol. 41, 1216–1220, 1996.
49. R.W. Aldhaheri and H.K. Khalil. Effect of unmodeled dynamics on output feedback stabilization of nonlinear systems. *Automatica*, vol. 32, 1323–1327, 1996.
50. N. Mahmoud and H.K. Khalil. Asymptotic regulation of minimum phase nonlinear systems using output feedback. *IEEE Trans. Automat. Contr.*, vol. 41, 1402–1412, 1996.
51. N. Mahmoud and H.K. Khalil. Robust control for a nonlinear servomechanism problem. *Int. J. Control*, vol. 66, 779–802, 1997.
52. K.W. Lee and H.K. Khalil. Adaptive output feedback control of robot manipulators using high-gain observers. *Int. J. Control*, vol. 67, 869–886, 1997.

53. S. Oh and H.K. Khalil. Nonlinear output feedback tracking using high-gain observer and variable structure control. *Automatica*, vol. 33, 1845–1856, 1997.
54. B. Aloliwi and H.K. Khalil. Robust adaptive output feedback control of nonlinear systems without persistence of excitation. *Automatica*, vol. 33, 2025–2032, 1997.
55. B. Aloliwi and H.K. Khalil. Adaptive output feedback regulation of a class of nonlinear systems: convergence and robustness. *IEEE Trans. Automat. Contr.*, vol. 42, 1714–1716, 1997.
56. M. Djemai, J.P. Barbot, and H.K. Khalil. Digital multi-rate control for a class of nonlinear singularly perturbed systems. *Int. J. Control*, vol. 72, 851–865, 1999.
57. A.N. Atassi and H.K. Khalil. A separation principle for the stabilization of a class of nonlinear systems. *IEEE Trans. Automat. Contr.*, vol. 44, 1672–1687, 1999.
58. A. Dabroom and H.K. Khalil. Discrete-time implementation of high-gain observers for numerical differentiation. *Int. J. Control*, vol. 72, 1523–1537, 1999.
59. E.G. Strangas, H.K. Khalil, B. Aloliwi, L. Laubinger, and J. Miller. Robust tracking controllers for induction motors without rotor position sensor: analysis and experimental results. *IEEE Trans. on Energy Conversion*, vol. 14, 1448–1458, 1999.
60. S. Seshagiri and H.K. Khalil. Output feedback control of nonlinear systems using RBF neural networks. *IEEE Trans. on Neural Networks*, vol. 11, 69–79, 2000.
61. H.K. Khalil. Universal integral controllers for minimum phase nonlinear systems. *IEEE Trans. Automat. Contr.*, vol. 45, 490–494, 2000.
62. A.N. Atassi and H.K. Khalil. Separation results for the stabilization of nonlinear systems using different high-gain observer designs. *Systems & Control Letters*, vol. 39, 183–191, 2000.
63. B. Aloliwi, H.K. Khalil, and E.G. Strangas. Robust speed control of induction motors: application to a benchmark example. *Int. J. Adaptive Control and Signal Processing*, vol. 14, 157–170, 2000.
64. S.-L.Chen, S.W. Shaw, H.K. Khalil, and A.W. Troesch. Robust stabilization of large amplitude ship rolling in beam seas. *J. of Dyn. Sys., Meas., and Contr.*, 122, 108–113, 2000.
65. H.K. Khalil. On the design of robust servomechanisms for minimum phase nonlinear systems. *Int. J. Robust and Nonlinear Control*, vol. 10, 339–361, 2000.
66. A.N. Atassi and H.K. Khalil. A separation principle for the control of a class of nonlinear systems. *IEEE Trans. Automat. Contr.*, vol. 46, 742–746, 2001.

67. A.M. Dabroom and H.K. Khalil. Output feedback sampled-data control of nonlinear systems using high-gain observers, *IEEE Trans. Automat. Contr.*, vol. 46, 1712–1725, 2001.
68. M.S. Mahmoud and H.K. Khalil. Robustness of high-gain observer-based nonlinear controllers to unmodeled actuators and sensors. *Automatica*, vol. 38, 361–369, 2002.
69. H.K. Khalil. Improved performance of universal integral regulators. *J. Optimization Theory and Applications*, vol. 115, 571–586, 2002.
70. H.K. Khalil. Performance recovery under output feedback sampled-data stabilization of a class of nonlinear systems. *IEEE Trans. Automat. Contr.*, vol. 49, 2173–2184, 2004.
71. H.S. Kay and H.K. Khalil. Universal integral controllers with non-linear integral gains. *Int. J. Control*, vol. 77, 1521–1531, 2004.
72. S. Seshagiri and H.K. Khalil. Robust output feedback regulation of minimum-phase nonlinear systems using conditional integrators. *Automatica*, vol. 41, 43–54, 2005.
73. W.G. Zanardelli, E.G. Strangas, H.K. Khalil, and J.M. Miller. Wavelet-based methods for the prognosis of mechanical and electrical failures in electric motors. *Mechanical Systems and Signal Processing*, vol. 19, 411–426, 2005.
74. S. Seshagiri and H.K. Khalil. Robust output regulation of minimum phase nonlinear systems using conditional servocompensators. *Int. J. Robust and Nonlinear Control*, vol. 15, 83–102, 2005.
75. A. Singh and H.K. Khalil. Regulation of nonlinear systems using conditional integrators. *Int. J. Robust and Nonlinear Control*, vol. 15, 339–362, 2005.
76. L.B. Freidovich and H.K. Khalil. Logic-based switching for the robust control of minimum-phase nonlinear systems. *Systems & Control Letters*, vol. 54, 713–727, 2005.
77. H.K. Khalil. A note on the robustness of high-gain-observer-based controllers to unmodeled actuator and sensor dynamics. *Automatica*, vol. 41, 1821–1824, 2005.
78. T.H. Kandil, H.K. Khalil, J. Vincent, T.L. Grimm, W. Hartung, J. Popielarski, R.C. York, and S. Seshagiri. Adaptive feedforward cancellation of sinusoidal disturbances in superconducting RF cavities. *Nuclear Instruments & Methods In Physics Research Section A-Accelerators Spectrometers Detectors and Associated Equipment*, vol. 550, 514–520, 2005.
79. L.B. Freidovich and H.K. Khalil. Lyapunov-based switching control of nonlinear systems using high-gain observers. *Automatica*, vol. 43, 150–157, 2007.

80. J. Ahrens and H.K. Khalil. Closed-Loop Behavior of a Class of Nonlinear Systems Under EKF-based Control. *IEEE Trans. Automat. Contr.*, vol. 52, 536–540, 2007.
81. L.K. Vasiljevic and H.K. Khalil. Error bounds in differentiation of noisy signals by high-gain observers. *Systems & Control Letters*, vol. 57, 856–862, 2008.
82. L.B. Freidovich and H.K. Khalil. Performance recovery of feedback-linearization-based designs. *IEEE Trans. Automat. Contr.*, vol. 53, 2324–2334, 2008.
83. J. Ahrens and H.K. Khalil. High-gain observers in the presence of measurement noise: A switched-gain approach. *Automatica*, vol. 45, 936–943, 2009.
84. H.K. Khalil and E.G. Strangas and S. Jurkovic. Speed observer and reduced nonlinear model for sensorless control of induction motors. *IEEE Trans. Contr. Syst. Tech.*, vol. 17, 327–339, 2009.
85. J.H. Ahrens and X. Tan and H.K. Khalil. Multirate sampled-data output feedback control with application to smart material actuated systems. *IEEE Trans. Automat. Contr.*, vol. 54, 2518–2529, 2009.
86. H.K. Khalil. Analysis of Sampled-Data High-Gain Observers in the Presence of Measurement Noise. *European Journal Of Control*, vol. 15, 166–176, 2009.
87. K. Ma and H.K. Khalil. On the Transient Response of a Nonlinear Output Regulator. *IEEE Trans. Automat. Contr.*, vol. 55, 1455–1460, 2010.
88. A.Y. Memon and H.K. Khalil. Output Regulation of Nonlinear Systems Using Conditional Servocompensators. *Automatica*, vol. 46, 1119–1128, 2010.
89. M.S. Nazrulla and H.K. Khalil. Robust stabilization of non-minimum phase nonlinear systems using extended high gain observers. *IEEE Trans. Automat. Contr.*, vol. 56, 802–813, 2011.
90. J. Liu, H.K. Khalil, and K.G. Oweiss. Model-based analysis and control of a network of basal ganglia spiking neurons in the normal and Parkinsonian states. *Journal of Neural Engineering*, vol. 8, paper # 045002, 2011.
91. J. Liu, H.K. Khalil, and K.G. Oweiss. Neural feedback for instantaneous Spatiotemporal modulation of afferent pathways in bi-directional brain-machine interfaces. *IEEE Trans. Neural Syst. Rehabil. Eng.*, vol. 19, 521–533, 2011.
92. R. Li and H.K. Khalil. Nonlinear output regulation with adaptive conditional servocompensator. *Automatica*, vol. 48, 2550–2559, 2012.
93. R. Li and H.K. Khalil. On the steady-state error of a nonlinear regulator. *Int. J. Robust and Nonlinear Control*, vol. 23, 1869–1879, 2013.

94. K. Ma, H.K. Khalil, Y. Yao. Guidance law implementation with performance recovery using an extended high-gain observer. *Aerospace Science and Technology*, vol. 24, 177–186, 2013.
95. A.A. Prasov and H.K. Khalil. A nonlinear high-gain observer for systems with measurement noise in a feedback control framework. *IEEE Trans. Automat. Contr.*, vol. 58, 569–580, 2013.
96. A. Esbrook, X. Tan, and H.K. Khalil. Control of systems with hysteresis via servo-compensation and its application to nanopositioning. *IEEE Trans. Contr. Sys. Tech.*, vol. 21, 725–738, 2013.
97. A. Esbrook, X. Tan, and H.K. Khalil. An indirect adaptive servocompensator for signals of unknown frequencies with application to nanopositioning. *Automatica*, vol. 49, 2006–2016, 2013.
98. A.M.A. Boker and H.K. Khalil. Nonlinear observers comprising high-gain observers and Extended Kalman Filters. *Automatica*, vol. 49, 3583–3590, 2013.
99. H.K. Khalil and L. Praly. High-gain observers in nonlinear feedback control. *Int. J. Robust and Nonlinear Control*, vol. 24, 993–1015, 2014.
100. A. Esbrook, X. Tan, and H.K. Khalil. Inversion-free stabilization and regulation of systems with hysteresis via integral action. *Automatica*, vol. 50, 1017–1025, 2014.
101. A. Esbrook, X. Tan, and H.K. Khalil. Self-excited limit cycles in an integral-controlled system with backlash. *IEEE Trans. Automat. Contr.*, vol. 59, 1020–1025, 2014.
102. M. Edardar, X. Tan, and H.K. Khalil. Tracking error analysis for feedback systems with hysteresis inversion and fast linear dynamics. *J. of Dyn. Sys., Meas., and Contr.*, vol. 136, 2014.
103. M. Edardar, X. Tan, and H.K. Khalil. Design and analysis of sliding mode controller under approximate hysteresis compensation. *IEEE Trans. Contr. Sys. Tech.*, vol. 23, 598–608, 2015.
104. J. Lee, R. Mukherjee, and H.K. Khalil. Output feedback stabilization of inverted pendulum on a cart in the presence of uncertainties. *Automatica*, vol. 54, 146–157, 2015.
105. R. Jafari, F.B. Mathis, R. Mukherjee and H. Khalil. Enlarging the region of attraction of equilibria of underactuated systems using impulsive inputs. *IEEE Trans. Contr. Sys. Tech.*, vol. 24, 334–340, 2016.
106. A.A. Prasov and H.K. Khalil. Tracking performance of a high-gain-observer in the presence of measurement noise. *Int. J. Adaptive Control and Signal Processing*, vol. 30, 1228–1243, 2016.

107. J. Lee, R. Mukherjee, and H.K. Khalil. Output feedback performance recovery in the presence of uncertainties. *Systems & Control Letters*, vol. 90, 31–37, 2016.
108. J. Lei and H.K. Khalil. High-gain-predictor-based output feedback control for time-delay nonlinear systems. *Automatica*, vol. 71, 324–333, 2016.
109. J. Lei and H.K. Khalil. Feedback linearization for nonlinear systems with time-varying input and output delays by using high-gain predictor. *IEEE Trans. Automat. Contr.*, vol. 61, 2262–2268, 2016.
110. H.K. Khalil. Cascade high-gain observers in output feedback control. *Automatica*, vol. 80, 110–118, 2017.
111. H.K. Khalil. Extended high-gain observers as disturbance estimators. *SICE Journal of Control, Measurement, and System Integration*, vol. 10, 125–134, 2017.
112. H.K. Khalil. High-gain observers in feedback control: application to permanent magnet synchronous motors. *IEEE Control Systems Magazine*, vol. 37, 25–41, 2017.
113. D. Chowdhury and H.K. Khalil. Fast consensus in multi-agent systems with star topology using high gain observers. *IEEE Control Systems Letters*, vol. 1, 188–193, 2017.
114. A.M. Boker and H.K. Khalil. Semi-global output feedback stabilization of non-minimum phase nonlinear systems. *IEEE Trans. Automat. Contr.*, vol. 62, 4005–4010, 2017.

Chapters or Articles in Books

- H.K. Khalil. Linear-Quadratic-Gaussian estimation and control of singularly perturbed systems (invited paper). In: Ardema, M. D., editor, *Singular Perturbations in Systems and Control*, 191-214, New York, Springer-Verlag, 1983.
- H.K. Khalil. Singular perturbations and automatic control. In *Encyclopedia of Systems and Control*, 4435-4439, Pergamon Press, 1987.
- H.K. Khalil. State feedback control: two stage feedback design by slow-fast decomposition. In *Encyclopedia of Systems and Control*, 4529-4534, Pergamon Press, 1987.
- H.K. Khalil. Nonlinear systems. In: Masten, M.K. (editor) *Modern Control Systems (a study guide)*, IEEE, 1995.
- H.K. Khalil. Two-time-scale methods. In the *Control Handbook*, W.S. Levine, editor, 873–879, CRC Press and IEEE Press, 1996
- H.K. Khalil. Lyapunov stability. In the *Control Handbook*, W.S. Levine, editor, 889–895, CRC Press and IEEE Press, 1996

- H.K. Khalil. Nonlinear control: adaptation and learning. In Applications of Neural Adaptive Control Technology, J. Kalkkuhl et. al., editors, World Scientific Series in Robotics and Intelligent Systems, vol. 17, 1997.
- H.K. Khalil. High-gain observers in nonlinear feedback control. In New Directions in Nonlinear Observer Design, Lecture Notes in Control and Information Sciences, H. Nijmeijer and T.I. Fossen, editors, vol. 244, 249-268, 1999.
- P.V. Kokotovic. J.H. Chow, and H.K. Khalil, Singularly perturbed systems. In Wiley Encyclopedia of Electrical and Electronics Engineering, J.G. Webster, editor, vol. 19, 1999.
- H.K. Khalil and S.W. Shaw. Stability theory, nonlinear. In Wiley Encyclopedia of Electrical and Electronics Engineering, J.G. Webster, editor, vol. 20, 390-398, 1999.
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