

ROBERT E. SKELTON

TEES Distinguished Research Professor

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EDUCATION

- 1963 B.S. Electrical Engineering, Clemson University.
1970 M.S. Electrical Engineering, University of Alabama, Huntsville.
1976 Ph.D. Mechanics and Structures, University of California, Los Angeles.

ACADEMIC EMPLOYMENT

- 1975-78 Assistant Professor, Purdue University, School of Aeronautics and
Astronautics
1978-82 Associate Professor, Purdue University, School of Aeronautics and
Astronautics
1982-96 Professor, Purdue University, School of Aeronautics and
Astronautics
1991-96 Director, Structural Systems and Control Laboratory, Institute for
Interdisciplinary Engineering Studies, Purdue University
1996-2009 UCSD Professor, Director Structural Systems and Control
Laboratory
2000-02 UCSD, Director Aerospace Program (interdepartmental program),
2006-09 Daniel L Alspach Professor of Dynamics and Control, UCSD
2009- Professor Emeritus, UCSD
2014 TIAS Faculty Fellow Texas A&M University
2015- TEES Distinguished Research Professor, Texas A&M University

Industrial Experience:

- 1965-75 Sperry Rand Corporation, Huntsville, Alabama. Head of Controls Research and
Development Section of Sperry Rand Corporation, Space Support Division;
Development of Pointing controller for SKYLAB; Throttle Control Concepts for
Space Shuttle Main Engine; Attitude controls for NASA's High Energy
Astronomy Observatory, Large Space Telescope; Control concepts for fluid
dynamics in project THERMO.
1963-65 Engineer, Lockheed Missiles and Space Company, Huntsville, Alabama.
Developed a new laboratory for research in fluidic devices for flight systems
control. Responsible for design and operation of NASA's air bearing Space
Vehicle Attitude Motion Simulator. Developed thrust vector control schemes for
large rocket engines.

Awards and Honors, Appointments:

2014	TIAS Faculty Fellow, Texas A&M University
2014	Member Thomas Green Clemson Academy of Engineering
2012	Member National Academy of Engineering
2011	Alexander von Humboldt Foundation Research Award
2005	NASA Appreciation Award for service to the Hubble repair missions
2003	Distinguished Engineer Award, University Alabama Huntsville
2000-02	Director Aerospace Program (interdepartmental program), UCSD
2000-02	AIAA Student Chapter Advisor
1999	Distinguished Lecturer Award, University of Maryland
1999	Norman Medal, American Society of Civil Engineers
1997-99	Member, External Independent Readiness Review Committee, Second and Third Servicing Mission for the Hubble Space Telescope
1995	Fellow, Institute of Electrical and Electronic Engineers (IEEE)
1991	Humboldt Senior U.S. Scientist Award, Alexander von Humboldt Foundation
1991	Certificate of Appreciation, NASA Control-Structures Interaction, Guest Investigator Program
1991	Russell Severance Springer Chair, University of California Berkeley
1990	Fellow, American Institute of Aeronautics and Astronautics (AIAA)
1989-94	Vice Chairman of Applications Technical Committee, International Federation of Automatic Control (IFAC)
1986	Japan Society for the Promotion of Science Award,
1984-85	National Research Council ad hoc committee on NASA-Universities Relationships in Aero/Space Engineering
1983-88	Member, National Research Council's Aeronautics and Space Engineering Board (ASEB)
1983-86	Member Educational Policy Committee, Purdue University
1983-86	Member University Senate, Purdue University
1981	Jane's Who's Who in Aviation and Aerospace, U.S. Edition
1974	SKYLAB Achievement Award from James Fletcher, Administrator, NASA
1970	ORBIT Award, Sperry Rand Corp
1963	Walter Merit Riggs Award, Clemson University
1963	Who's Who Among Students in American Colleges and Universities
1962-63	W.F. Poole Alumni Scholarship, Clemson University
1961-62	Clemson Engineering Foundation Scholarship
1960	Certificate of Appreciation for Excellence in Teaching, United States Marine Corps

Associate Editorships

Mathematical Modelling of Systems, published by Swets and Zeitlinger, the Netherlands, 1994- present.

Mathematical Problems in Engineering, published by Gordon and Breach Publishing Group, U.S.A., 1994- present.

Journal of Systems & Control Engineering 10/98 – present.

Applied Mechanics Reviews 1/01 – present.

Actual Problems of Aviation and Aerospace Systems, Russian-American Scientific Journal,
ISSN 1727-6853, Kazan, Russia

Society Memberships:

1995 Fellow, Institute of Electrical and Electronics Engineers

1990 Fellow, American Institute of Aeronautics and Astronautics

1972 Secretary, Huntsville Section, Alabama, Automatic Control Society, IEEE

1969 Chairman, Huntsville Section, Alabama, Automatic Control Society, IEEE

Tau Beta Pi, Phi Kappa Phi, Phi Eta Sigma, Sigma Gamma Tau, Sigma Xi

RESEARCH

Publications, Refereed Journal Papers:

- J1 Johnson, C.D., R.E. Skelton, "Optimal Desaturation of Momentum Exchange Control Systems," *AIAA Journal*, Vol. 9, No. 1, pp. 12-22, January 1971.
- J2 Skelton, R.E., "An Algorithm for an Approximation of the Minimal Controller Problem," *Journal of Guidance and Control*, Vol. 1, No. 1, pp. 90-93, Jan.-Feb. 1978.
- J3 Skelton, R.E., P.W. Likins, "Orthogonal Filters for Model Error Compensation in the Control of Nonrigid Spacecraft," *AIAA Journal of Guidance & Control*, Vol. 1, No. 1, Jan.-Feb. 1978, pp. 41-49. (Selected by USSR for translation in the USSR Journal PAKETHA TEXH KA KOCHMOHABT KA, Mar. 1978.)
- J4 Skelton, R.E., "On Cost-Sensitivity Controller Design Methods for Uncertain Dynamic Systems" (Invited paper), *Journal Astronautic Sciences*, Vol. XXVII, No. 2, pp. 181-205, Apr-June 1979.
- J5 Skelton, R.E., "Observability Measures and Performance Sensitivity in the Model Reduction Problem," *International Journal of Control*, Vol. 29, No. 4, pp. 541-556, 1979.
- J6 Skelton, R.E., "Application of Disturbance Accommodating Control in the Model Error Problem," *Journal of Interdisciplinary Modeling and Simulation*, Vol. 3, No. 1, pp. 47-62, 1980.
- J7 Skelton, R.E., "Cost Decomposition of Linear Systems, with Application to Model Reduction," *International Journal of Control*, Vol. 32, No. 6, pp. 1031-1055, 1980.
- J8 Hughes, P.C., R.E. Skelton, "Controllability and Observability for Linear-Matrix-Second-Order Systems," *Journal of Applied Mechanics*, Vol. 47, No. 2, pp. 415-421, June 1980.

- J9 Hughes, P.C., R.E. Skelton, "Controllability and Observability for Flexible Spacecraft," *Journal of Guidance and Control*, Vol. 3, No. 5, pp. 452-460, Sept. 1980.
- J10 Skelton, R.E., P.C. Hughes, "Modal Cost Analysis for Linear-Matrix-Second-Order Systems," *Journal of Dynamic Systems*, Vol. 102, pp. 151-158, Sept. 1980.
- J11 Skelton, R.E., "Adaptive Orthogonal Filters for Compensation of Model Errors in Matrix-Second-Order Systems," *Journal of Guidance and Control*, Vol. 4, No. 2, pp. 214-221, Mar. 1981.
- J12 Hughes, P.C., R.E. Skelton, "Modal Truncation for Flexible Spacecraft," *Journal of Guidance and Control*, Vol. 4, No. 3, pp. 291-297, May-June 1981.
- J13 Yedavalli, R.K., R.E. Skelton, "Controller Design for Parameter Sensitivity Reduction in Linear Regulators," *Optimal Control Applications and Methods*, Vol. 3, pp. 221-240, 1982.
- J14 Skelton, R.E., P.C. Hughes, H.B. Hablani, "Order Reduction for Models of Space Structures Using Modal Cost Analysis," *Journal of Guidance and Control*, Vol. 5, No. 4, pp. 351-357, July-Aug. 1982.
- J15 Skelton, R.E., A. Yousuff, "Component Cost Analysis of Large Scale Systems," *Int'l. Journal of Control*, Vol. 37, No. 2, pp. 285-304, 1983.
- J16 Skelton, R.E., M.L. DeLorenzo, "Selection of Noisy Actuators and Sensors in Linear Stochastic Systems," *Large Scale Systems*, Vol. 4, pp. 109-136, 1983.
- J17 Skelton, R.E., "Comments on Order Reduction of Linear State Space Models via Optimal Approximation of the Non-Dominant Modes," *Large Scale Systems*, Vol. 5, pp. 263-264, 1983.
- J18 Skelton, R.E., J. Davis, "Comments on Realization and reduction of Markovian Models from Nonstationary Data," *IEEE Transactions on Automatic Control*, Vol. AC-28, No. 4, Apr. 1983.
- J19 Skelton, R.E., Di Chiu, "Optimal Selection of Inputs and Outputs in Linear Stochastic Systems," *Journal Astronautical Sciences*, Vol. 31, No. 3, pp. 399-414, July 1983.
- J20 Yedavalli, R.K., R.E. Skelton, "Determination of Critical Parameters in Large Flexible Space Structures with Uncertain Modal Data," *Journal Dynamics Systems, Measurement, and Control*, Vol. 105, pp. 238-244, Dec. 1983.
- J21 Yousuff, A., R.E. Skelton, "Controller Reduction by Component Cost Analysis," *IEEE Transactions on Automatic Control*, Vol. AC-29, No. 3, 1984.
- J22 Skelton, R.E., D.A. Wagie, "Minimal Root Sensitivity in Linear Systems," *Journal of Guidance, Control and Dynamics*, Vol. 7, No. 5, Sept. 1984.

- J23 Davis, J., R.E. Skelton, "Another Balanced Controller Reduction Algorithm," *System and Control Letters*, Vol. 4, pp. 79-83, 1984.
- J24 Yousuff, A., R.E. Skelton, "A Note on Balanced Controller Reduction," *IEEE Transactions on Automatic Control*, Vol. AC-29, No. 3, Mar. 1984.
- J25 Frazho, A.E., R.E. Skelton, D.A. Wagie, "Compliments to Cost-Equivalent Realizations," *International Journal of Control*, Vol. 40, No. 5, pp. 1045-1048, 1984.
- J26 Skelton, R.E., A. Hu, "Modeling Structures for Control Design," *Computers and Structures*, Vol. 20, No. 1-3, pp. 303-309, 1985.
- J27 Yousuff, A., D.A. Wagie, R.E. Skelton, "Linear System Approximation via Covariance Equivalent Realizations," *Journal Mathematical Analysis & Applications*, Vol. 106, No. 1, pp. 91-115, Feb. 1985.
- J28 Skelton, R.E., M.L. DeLorenzo, "Space Structure Control Design by Variance Assignment," *Journal Guidance Control Dynamics*, July 1985.
- J29 Berry, D.T., T.Y. Yang, R.E. Skelton, "Dynamics and Control of Lattice Beams Using Complex and Simplified Finite Element Models," *Journal Guidance Control Dynamics*, Vol. 8, No. 5, pp. 612-619, Sept. 1985.
- J30 Wagie, D.A., R.E. Skelton, "Model Reduction and Controller Synthesis in the Presence of Parameter Uncertainty," *Automatica*, Vol. 2, No. 3, pp. 295-308, 1986.
- J31 Yousuff, A., R.E. Skelton, "An Optimal Controller Reduction by Covariance Equivalent Realizations," *IEEE Transactions on Automatic Control*, Vol. AC-31, No. 1, pp. 56-60, Jan. 1986.
- J32 Skelton, R.E., P. Kabamba, "Balanced Gain and their Significance in L_2 Model Reduction," *IEEE Transactions on Automatic Control*, Vol. AC-31, No. 8, pp. 796-797, Aug. 1986.
- J33 Skelton, R.E., B.D.O. Anderson, "Q-Markov Covariance Equivalent Realizations," *International Journal of Control*, Vol. 44, No. 5, pp. 1477-1490, 1986.
- J34 Wagie, D.A., R.E. Skelton, "A Projection Approach to Covariance Equivalent Realizations of Discrete Systems," *IEEE Trans. on Automatic Control*, Vol. AC-31, No. 12, pp. 1114-1120, Dec. 1986.
- J35 Collins, E.G., R.E. Skelton, "A Theory of State Covariance Assignment for Discrete Systems," *IEEE Transactions on Automatic Control*, Vol. AC-32, No. 1, Jan. 1987.
- J36 Hu, Anren, R.E. Skelton, T.Y. Yang, "Modeling and Control of Beam-like Structures," *Journal Sound and Vibration*, Vol. 117, No. 3, pp. 475-496, 1987.

- J37 Hotz, A., R.E. Skelton, "Covariance Control Theory," *Int'l. J. Control*, Vol. 46, No. 1, pp. 13-32, 1987.
- J38 Collins, E.G., R.E. Skelton, "A set of Q-Markov Covariance Equivalent Models of Discrete Systems," *International Journal Control*, Vol. 46, No. 1, pp. 1-12, 1987.
- J39 de Villemagne, C., R.E. Skelton, "Model Reductions Using a Projection Formulation," *International Journal Control*, Vol. 46, No. 6, 2141-2169, 1987.
- J40 Desai, U.B., R.E. Skelton, "Partially Nested Q-Markov Covariance Equivalent Realizations," *Control Theory and Advanced Technology*, Vol. 3, No. 4, pp. 323-342, Dec. 1987.
- J41 Anderson, B.D.O., R.E. Skelton, "The Generation of All Q-Markov COVERS," *IEEE Circuits and Systems*, Vol. 35, No. 4, pp. 375-384, Apr. 1988.
- J42 King, A.M., U.B. Desai, R.E. Skelton, "A Generalized Approach to Covariance Equivalent Realizations for Discrete Systems," *Automatica*, Vol. 24, No. 4, pp. 507-515, July 1988.
- J43 de Villemagne, C., R.E. Skelton, "Controller Reduction Using Canonical Interactions," *IEEE Transactions on Automatic Control*, Vol. 33, No. 8, 1988.
- J44 Skelton, R.E., Norris, G., "Selection of Sensors and Actuators in the Presence of Correlated Noise," *Control Theory and Advanced Technology*, Vol. 4, No. 1, pp. 53-71, 1988.
- J45 Hu, A., R.E. Skelton, "Convergence Properties of Modal Costs for Certain Distributed Parameter Systems," *Journal Vibration, Acoustics, Stress & Reliability in Design* (ASME), Vol. 111, pp. 272-277, July 1989.
- J46 Skelton, R.E., "Model Error Concepts in Control Design," *International Journal Control*, Vol. 49, No. 5, pp. 1725-1753, 1989.
- J47 Skelton, R.E., M. Ikeda, "Covariance Controllers for Linear Continuous-Time Systems," *International Journal Control*, Vol. 49, No. 5, pp. 1773-1785, 1989.
- J48 Skelton, R.E., B.D.O. Anderson, "Weighted Q-Markov Covers," *Int'l. Journal Control*, 1989.
- J49 Norris, G., R.E. Skelton, "Selection of Dynamic Sensors and Actuators in the Control of Linear Systems," *ASME Journal Dynamic Systems, Meas. & Control*, Vol. 111, pp. 389-397, Sept. 1989.
- J50 Williamson, D., R.E. Skelton, "Optimal Q-Markov Cover for Finite Wordlength Implementation," *Math. Systems Theory*, Vol. 22, No. 4, pp. 255-273, 1989.

- J51 Skelton, R.E., Dong Da, "Component Model Reduction in Canonical Correlation Coordinates," *Computational Mechanics*, 1989.
- J52 Hsieh, C., R. Skelton, F. Damra, "Minimum Energy Controllers with Inequality Constraints on Output Variances," *Optimal Control Application and Methods*, Vol. 10, No. 4, pp. 347-366, 1989.
- J53 Skelton, R.E., B.D.O. Anderson, "Weighted Q-Markov Covariance Equivalent Realization," *International Journal Control*, 1989.
- J54 Okada, K., R.E. Skelton, "Sensitivity Controller for Uncertain Systems," *AIAA J. Guidance, Control and Dynamics*, Vol. 13, No. 2, Mar. 1990.
- J55 Hsieh, C., R.E. Skelton, "All Covariance Controllers for Linear Discrete Time Systems," *IEEE Transactions on Automatic Control*, Vol. 35, No. 8, Aug. 1990.
- J56 Damra, F.M., R.E. Skelton, J. Xu, "Optimal Covariance Control," *Optimal Control Application and Methods*, 1990.
- J57 Xu, J., R.E. Skelton, G. Zhu, "Upper and Lower Covariance Bounds for Perturbed Linear Systems," *IEEE Transactions on Automatic Control*, Vol. 35, No. 8, Aug. 1990, pp. 944-948.
- J58 Xu, J., R. Skelton, "Output Feedback Controllers of Suboptimality Degree ϵ ," *IEEE Transactions on Automatic Control*, Vol. 35, No. 12, Dec. 1990.
- J59 Williamson, D., R.E. Skelton, G. Zhu, "Moment Matching Model Reduction for Multirate Linear Systems," *International Journal Control*, Vol. 52, No. 6, pp. 1279-1294, 1990.
- J60 Yasuda, K., R. Skelton, "Assigning Controllability and Observability Gramians in Feedback Control," *Journal Guidance Control Dynamics*, Vol. 14, No. 5, pp. 878-885, Sept.-Oct. 1991.
- J61 Zhu, G., R. E. Skelton, "Mixed L_2 and L_2 Problems by Weight Selection in Quadratic Optimal Control," *International Journal Control*, Vol. 63, No. 5, pp. 1161-1176, 1991.
- J62 Skelton, R., J. Xu, K. Yasuda, "On the Freedom in Covariance Control," *Int'l. Journal Control*, 1991.
- J63 Hsieh, C., J. Kim, K. Liu, G. Zhu, R. Skelton, "Control of Large Flexible Structures -- An Experiment on the NASA Mini-Mast Facility," *IEEE Control Magazine*, Vol. 8, pp. 13-21, Oct. 1991.
- J64 Smith, M., K. Grigoriadis, R. Skelton, "Optimal Mix of Passive and Active Control in Structures," *Journal of Guidance, Control and Dynamics*, Vol. 15, No. 4, pp. 912-919, July-Aug. 1992.

- J65 Liu, K., R. Skelton, "The Q-Markov Cover and its Application to Flexible Structure Identification," *Journal Guidance Control Dynamics*, Vol. 57, No. 2, 1992.
- J66 Skelton, R., B. Hanks, M. Smith, "Structure Redesign for Improved Dynamic Response," *Journal Guidance Control Dynamics*, Vol. 15, No. 5, pp. 1272-1278, 1992.
- J67 Skelton, R. E., G. Zhu, "Optimal L_∞ Bounds for Disturbance Robustness," *IEEE Transactions on Automatic Control*, Vol. 37, No. 10, pp. 1568-1572, 1992.
- J68 Xu, J., R. Skelton, "An Improved Covariance Assignment Theory for Discrete Systems," *IEEE Transactions on Automatic Control*, Vol. 37, No. 10, pp. 1588-1591, 1992.
- J69 Zhu, G., R. Skelton, "Robust Discrete Controllers Guaranteeing l_2 and l_∞ Performances," *IEEE Transactions on Automatic Control*, Vol. 37, No. 10, pp. 1620-1625, 1992.
- J70 Liu, K., R. Skelton, K. Grigoriadis, "Optimal Controllers for Finite Wordlength Implementation," *IEEE Transactions on Automatic Control*, Vol. 37, No. 9, pp. 1294-1304, 1992.
- J71 Zhu, G., R. Skelton, "Robust Properties of Periodic Discrete and Multirate Systems," *IEEE Transactions on Automatic Control*, Vol. 37, No. 3, pp. 610-615, 1992.
- J72 Zhu, G., R. Skelton, "A Two-Riccati, Feasible Algorithm for Guaranteeing Output L_∞ Constraints," *Journal of Dynamic Systems, Measurement and Control*, Vol. 114, No. 3, pp. 329-338, 1992.
- J73 Liu, Ketao, Robert E. Skelton, "Integrated Modeling and Controller Design with Application to Flexible Structure Control," *Automatica*, Vol. 29, No. 5, pp. 1291-1314, 1993.
- J74 Skelton, R.E., "The Routh Test and Covariance Control," *C-TAT*, Vol. 9, No. 3, pp. 691-720, 1993.
- Skelton, R.E., T. Iwasaki, "Liapunov and Covariance Controllers," *International Journal Control*, Vol. 57, No. 3, pp. 519-536, 1993.
- J75 Zhu, G., R.E. Skelton, "MIMO L_2/L_∞ Constraints in Large Flexible Structure Control -- An Experiment on the JPL LSCL Facility," *Journal of Society of Instrument and Control Engineers*, Vol. 32, No. 4, pp. 284-289, 1993.
- J76 Liu, K., R. E. Skelton, "Q-Markov Covariance Equivalent Realization and its Application to Flexible Structure Ident.," *Journal of Guidance, Control, & Dynamics*, Vol. 16, No. 2, Mar.-Apr. 1993.
- J77 Yasuda, K., R.E. Skelton, K.M. Grigoriadis, "Covariance Controllers: A New

- Parametrization of the Class of All Stabilizing Controllers,” *Automatica*, Vol. 29, No. 3, pp. 785-788, 1993.
- J78 Iwasaki, T., R.E. Skelton, “n the Observer-based Structure of Covariance Controllers,” *Systems and Control Letters*, Vol. 22, pp. 17-25, 1994.
- J79 Liu, K., R.E. Skelton, J.P. Sharkey, “Modeling Hubble Space Telescope Flight Data by Q-Markov Cover Ident.,” *J. of Guidance, Control & Dynamics*, Vol. 17, No. 2, pp. 250-256, Mar.-Apr. 1994.
- J80 Yaz, E., R.E. Skelton, “Parametrization of All Linear Compensators for Discrete-Time Stochastic Parameter Systems,” *Automatica*, Vol. 30, No. 6, pp. 945-955, June 1994.
- J81 Zhu, G., R. E. Skelton, “Integrated Modeling and Control for the Large Spacecraft Control Laboratory Experiment Facility,” *J. of Guidance Control and Dynamics*, Vol. 17, No. 3, pp. 442-450, May-June 1994.
- J82 Iwasaki, T., R.E. Skelton, “All Controllers for the General H_∞ Control Problem: LMI Existence Conditions and State Space Formulas,” *Automatica*, Vol. 30, No. 8, Aug. 1994.
- J83 Stoustrup, J., R. Skelton, T. Iwasaki, “The H_∞ Control Problem Using Static Output Feedback,” *Int'l. Journal of Robust and Nonlinear Control*, Special Issue on H_∞ Vol. 4, No. 4, pp. 449-456, July 1994.
- J84 Grigoriadis, K. M., A. E. Frazho, R. E. Skelton, “Application for Computation of Positive Toeplitz Matrices,” *IEEE Transactions on Signal Processing*, Vol. 42, July 1994.
- J85 Skelton, R. E., J. H. Xu, K. Yasuda, “Minimal Energy Covariance Control,” *International Journal of Control*, Vol. 59, No. 6, pp. 1567-1578, July 1994.
- J86 Iwasaki, T., R. E. Skelton, J. C. Geromel, “Linear Quadratic Suboptimal Control with Static Output Feedback,” *Systems and Control Letters*, Vol. 23, pp. 421-430, 1994.
- J87 Grigoriadis, K. M., R. E. Skelton, “Alternating Convex Projection Methods for Covariance Control Design,” *International Journal of Control*, Vol. 60, No. 6, pp. 1083-1106, 1994.
- J88 Iwasaki, T., R. E. Skelton, “Parametrization of All Stabilizing Controllers via Quadratic Lyapunov Functions,” *Journal on Optimization Theory and Applications*, Vol. 85, No. 2, May 1995.
- J89 Zhu, G., K.M. Grigoriadis, R. E. Skelton, “Covariance Control Design for the Hubble Space Telescope,” *AIAA Journal of Guidance, Control, & Dynamics*, Vol. 18, No. 2, pp. 230-236, May 1995.
- J90 Zhu, G., R. E. Skelton, Pingkang Li, “Q-Markov Cover Identification Using Pseudo-

- Random Binary Signals,” *International Journal of Control*, Vol. 62, No. 6, pp. 1273-1290, 1995.
- J91 Iwasaki, T., R. E. Skelton, “The XY-centring Algorithm for the Dual LMI Problem: A New Approach to Fixed-order Control Design,” *Int'l. Journal of Control*, Vol. 62, No. 6, pp. 1257-1272, 1995.
- J92 Iwasaki, T., R. E. Skelton, “A Unified Approach to Fixed-Order Controller Design via Linear Matrix Inequalities,” *Mathematical Problems in Engineering*, Vol. 1, No. 1, pp. 59-75, 1995.
- J93 Iwasaki, T., R. E. Skelton, “All Fixed-Order H_∞ Controllers: Observer-Based Structure and Covariance Bounds,” *IEEE Transactions on Automatic Control*, Vol. 40, No. 3, IETAA9, pp. 512-516, Mar. 1995.
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- J95 Zhu, G. G., R. E. Skelton, “ L_2 to L_∞ Gains for Sampled-data Systems,” *Int'l. Journal of Control*, Vol. 61, No. 1, pp. 19-32, 1995.
- J96 Grigoriadis, K.M., R.E. Skelton, “Alternating convex projection methods for discrete-time covariance control design,” *Journal of Optimization Theory and Applications*, vol.88, no.2, pp.399-432, Feb. 1996.
- J97 Iwasaki, T. Skelton, R., Corless, M., “A Recursive Construction Algorithm for Covariance Control”, *IEEE Transaction on Automatic Control*, March 1996.
- J98 Skelton, R.E., G. Shi, “Iterative identification and control using a weighted q-Markov COVER with measurement noise,” *Signal Processing*, vol.52, no.2, pp.217-34, July 1996.
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- J101 Zhu, G., M.A. Rotea, R. Skelton “A convergent algorithm for the output covariance constraint control problem,” *SIAM Journal on Control and Optimization*, vol. 35, no.1, pp.341-61, Jan. 1997.
- J102 Skelton, R.E., J. Lu, “Iterative identification and control design using finite-signal-to-noise models,” *Mathematical Modelling of Systems*, vol.3, no.1, pp.102-35, Jan. 1997

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- J106 Lu, J., R.E. Skelton, "Optimal Hybrid Control for Structures," *Computer-Aided Civil and Infrastructure Engineering* 13, 1998, pp405-414.
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- J110 Shi, G., Skelton, R., "Infinite Horizon Constrained Model Predictive Control for Stable ARX Models," to appear, *Automatica*.
- J111 Skelton, R.E., Hiramoto, H.D, "Active Control of Cantilevered Pipes Conveying Fluid with Constraints on Input Energy", *Journal of Fluids and Structures*, (1998) **Vol. 12, pp. 615-628**.
- J112 Lu, J., Skelton, R.E., "Covariance Control Using Closed-Loop Modelling for Structures", *Earthquake Engineering and Structural Dynamics*, **Vol. 27, pp. 1367-1383**, (1998).
- J113 Shi, G., Skelton, R., Zhu, G., "Closed-Loop Identification and MPC_Control Design for a Virtual Diesel Engine," *ASME Journal of Dynamic Systems, Measurement & Control*, March 1999.
- J114 Skelton, E., Lu, J., "Integrating Instrumentation and Control Design", *International Journal of Control*, 1999, **vol. 72, No. 9, pp. 799-814**.
- J115 Lu, J, Skelton, R., "Robust Variance Control for Systems with Finite-to-Noise Uncertainty," *Automatica*, **No. 36, pp. 511-525**, 2000.
- J116 Lu, J., Skelton, R.E., "Integrating Structure and Control Design to Achieve Mixed H_2 / H Performance", *International Journal of Control*, 2000 **Vol. 73, pp. 1449-1462**.

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- P223 Sultan, C. and Skelton, R. E., "Tendon Control Deployment of Tensegrity Structures," *Proc. of SPIE 5th Intl. Symposium on Smart Structures and Materials 1-5 March 1998*, San Diego, USA.
- P224 Sultan, C., Corless, M. and Skelton, R. E., "Nonlinear Robust Tracking Control of a Tensegrity Motion Simulator," *Proc. of SPIE 12th Intl. Conference on Sensing, Simulation and Control, AeroSense 98*, 13-17 April 1998, Orlando, USA.
- P225 Skelton, R., "An Introduction to Controllable Tensegrity Structures," *12th ASCE Engineering Mechanics Conf.*, La Jolla, CA, May 17-20, 1998.

- P226 Skelton, R., Adhikari, R., Helton, W., Pinaud, J/P., and Chan, W.A., "An Introduction to the Mechanics of Tensegrity systems," UCSD Structural Systems and Control La, Report 98-1, June 1998.
- P227 Adhikari, R., and Skelton, R., "An Introduction to Smart Tensegrity Structures," *Engineering Mechanics for the 21st Century*, ASCE Conference, La Jolla, California, May 17-20, 1998.
- P228 Williamson, A. and Skelton, R., "A General Class of Tensegrity Systems: Geometric Definition," *Engineering Mechanics for the 21st Century*, ASCE Conference, La Jolla, California, May 17-20, 1998.
- P229 Williamson, A. and Skelton, R., "A General Class of Tensegrity Systems: Equilibrium Analysis," *Engineering Mechanics for the 21st Century*, ASCE Conference, La Jolla, California, May 17-20, 1998.
- P230 Sultan, C., Corless, M., and Skelton, R.E., "Reduced Prestressable Conditions for Tensegrity Structures", AIAA/ASME/ASCE/AHS/ASC 40th Structures, Structural Dynamics and Materials Conference 12-15 April 1999, St. Louis, USA.
- P231 Han, J., and Skelton, R.E., "An LMI Optimization Approach to the Design of Structured Linear Controllers Using a Linearization Algorithm", IMECE '03 2003 ASME International Mechanical Engineering Congress and R & D Expo, Washington, D.C., November 15-21, 2003.
- P232 F. Fraternali, G. Carpentieri, R.E. Skelton, A. Micheletti, Architetture tensegrity parametriche per ponti di massa minima, (In italian), XXIV C.T.A. Congress "The Italians steel days", September 30th, 2013, October 2nd, 2013, Turin (Italy). Volume: 2, Pages: 890-897. ISBN: 978-88-905870-0-9.
- P233 G. Carpentieri, M. Modano, F. Fabbrocino, R.E. Skelton, F. Fraternali, Optimal design and dynamics of tensegrity bridges, COMPDYN 2015, 5th ECCOMAS Thematic Conference on Computational Methods in Structural Dynamics and Earthquake Engineering, Crete Island, Greece, 25-27 May 2015.
- P234 Skelton, R.E., Carpentieri, G., Fraternali, F. Energy harvesting tensegrity bridges (Ponti tensegrity per la cattura di energia solare), Atti del XXV CONGRESSO C.T.A. - XXV Italian Steel Days (Salerno, 1-3 Ottobre 2015), Vol. 1: Tensegrity and Stability (Tensegrity e Stabilità), 125-135, ISBN: 978-88-940089-4-4.
- P235 G. Carpentieri, F. Fraternali, C. Daraio, R.E. Skelton, On the non linear dynamics of tensegrity structures, Workshop "Multiscale Modeling and Characterization of Innovative Materials and Structures", Cetara (SA), Italy, May 1-5, 2013 (CD-ROM Proceedings).
- P236 F. Fraternali, G. Carpentieri, A. Amendola, V.F. Nesterenko, R.E. Skelton, Propagation of Solitary Waves on Acoustic Metamaterials, 13th International Symposium on

Multiscale, Multifunctional and Functionally Graded Materials (MM&FGM), São Paulo, Brazil, October 19-22, 2014 (CD-ROM Proceedings).

- P237 G. Carpentieri, R.E. Skelton, F. Fraternali, Optimal design and dynamics of tensegrity bridges, COMPDYN 2015, 5th ECCOMAS Thematic Conference on Computational Methods in Structural Dynamics and Earthquake Engineering, Crete Island, Greece, 25–27 May 2015.
- P238 F. Fraternali, G. Carpentieri, A. Amendola, R.E. Skelton, V.F. Nesterenko, Prestress tuning of the nonlinear dynamics of tensegrity metamaterials, COMPDYN 2015, 5th ECCOMAS Thematic Conference on Computational Methods in Structural Dynamics and Earthquake Engineering, Crete Island, Greece, 25–27 May 2015.
- P239 Henrickson, James V., John Valasek, and Robert E. Skelton. "Shape Control of Tensegrity Structures." AIAA SPACE 2015 Conference and Exposition. 2015.
- P240 Rohmer, J., Peraza Hernandez, E.A., Skelton, R., Hartl, D., Lagoudas, D., "An experimental and numerical study of the shape memory alloy-based tensegrity/origami structures", ASME 2015 IMECE, Nov., 2015.
- P250 Henrickson, James V., Robert E. Skelton, and John Valasek. "Shape Control of Tensegrity Airfoils." AIAA Guidance, Navigation, and Control Conference. 2016.

Technical Reports in Un-refereed Publications:

- R1 Skelton, R.E., "Gaseous Blowdown as an S-IVB Retro System," Lockheed Missiles and Space Company, Huntsville, AL, LMSC A033117, TM-54/01-28, Oct. 28, 1963.
- R2 Skelton, R.E., "Coordinate Transformations for an Attitude Motion Simulator," Lockheed Missiles and Space Company, Huntsville, AL, LMSC A711010, TM-54/60-1, Aug. 20, 1965.
- R3 Skelton, R.E., "Control Concepts for Project THERMO," Sperry Rand Corporation, Huntsville, AL, 517-66-13, Dec. 21, 1966.
- R4 Skelton, R.E., "Experiment Pointing Control Studies for ATM," Sperry Rand Corporation, Huntsville, AL, SP-522-0003, Oct. 20, 1967.
- R5 Skelton, R.E., "Rigid Two-Body Math Models for ATM," Sperry Rand Corporation, Huntsville, AL, SP-522-0048, Apr. 26, 1968.
- R6 Skelton, R.E. and Kimery, R., "An ATM Experiment Pointing Control System Design Without Rate Gyros," Sperry Rand Corporation, Huntsville, AL, SP-213-0121, Sept. 9, 1968.

- R7 Skelton, R.E., "Optimal Momentum Management in Momentum Exchange Controls Systems for Orbiting Vehicles," Sperry Rand Corporation, Huntsville, AL, SP-231-0176, Feb. 4, 1969.
- R8 Skelton, R.E., "On the Optimal Control of Control Moment Gyro Systems," Sperry Rand Corporation, Huntsville, AL, SP-230-0269, Sept. 8, 1970.
- R9 Skelton, R.E., "A Method of Determining SKYLAB Vehicle Attitudes to Minimize Momentum Accumulation in the Presence of Uncertain Venting Disturbances," Sperry Rand Corporation, Huntsville, AL, SP-230-0415, Oct. 5, 1970.
- R10 Skelton, R.E., "Controllability of HEAO Scan Mode," Sperry Rand Corporation, Huntsville, AL, SP-230-0512, Nov. 10, 1970.
- R11 Skelton, R.E., "On the Control of Spinning Vehicles with CMG's and the Estimation of Principal Axis Locations," Sperry Rand Corporation, Huntsville, AL, SP-250-0603, Jan. 31, 1972.
- R12 Skelton, R.E., "A Line of Sight Roll Mode for the SKYLAB Experiment Pointing Control System," Sperry Rand Corporation, Huntsville, AL, SP-225-0503, June 24, 1971.
- R13 Skelton, R.E., "Linearized Mathematical Models of the Aerodynamic and Gravity Gradient Torques Acting on Orbiting Vehicles," Sperry Rand Corporation, Huntsville, AL, SP-250-0534, Aug. 25, 1971.
- R14 Skelton, R.E. and Hendley, A.C., "A Three CMG Optimal Control Study for Space Station," Sperry Rand Corporation, Huntsville, AL, SP-250-6200-0015, Aug. 31, 1971.
- R15 Hendley, A.C. and Skelton, R.E., "A Four CMG Optimal Controller for Space Station," Sperry Rand Corporation, Huntsville, AL, SP-250-0547, Sept. 30, 1971.
- R16 Willyard, C. and Skelton, R.E., "Space Shuttle Main Engine Mathematical Model and a Throtttable Rocket Engine Optimal Controller Design Philosophy," Sperry Rand Corporation, Huntsville, AL, SP-250-0557, Oct. 28, 1971.
- R17 Muench, D. and Skelton, R.E., "Spinning Attitude Control Simulation with Application to High Energy Astronomy Observatory," Sperry Rand Corporation, Huntsville, AL, SP-252-0712, Aug. 25, 1972.
- R18 Skelton, R.E., Templeton, J., and Bapna, B., "A Simulation Program for the Near-Optimal Control of Partially Controllable Linear Systems," Vol. I, Vol. II, Vol. III, Sperry Rand Corporation, Huntsville, AL, SP-252-0718, Aug. 31, 1972.
- R19 Skelton, R.E., "Controllability of Momentum Exchange Controllers," Sperry Rand Corporation, Huntsville, AL, SP-250-0720, Aug. 31, 1972.

- R20 Singh, R. and Skelton, R.E., "Large Scale Telescope Attitude Control Study Part I: Momentum Exchange Controller," Sperry Rand Corporation, Huntsville, AL, SP-250-0746, Feb. 1, 1973.
- R21 Skelton, R.E., "Precise Pointing Control of Space Vehicles with Momentum Exchange Controllers," Sperry Rand Corporation, Huntsville, AL, SP-250-754, Feb. 21, 1973.
- R22 Skelton, R.E., "Evaluation of Sorel (Solar Orbiting Relativity Satellite) Control System," Sperry Rand Corporation, Huntsville, AL, SP-250-800, Sept. 4, 1973.
- R23 Adhikari, R., R. Skelton, and W. Helton, "Mechanics of Tensegrity Structures," Report 1998-01, UCSD Structural Systems and Control Lab, Feb., 1998.

Invited Seminars, Colloquia:

- Col1 "Accommodating Modal Uncertainty in the Control of Spacecraft," UCLA Mechanics and Structures Department, June 1976.
- Col2 "Model Reduction for Flexible Spacecraft by Modal Cost Analysis," University of Toronto, Institute of Aerospace Studies, Dec. 17, 1979.
- Col3 "Model and Controller Reduction in Large Scale Systems Using Component Cost Analysis," Renssalaer Polytechnic Institute, Electrical Engineering Department Jan. 24, 1980.
- Col4 "Model Reduction," Stanford University, Department of Aeronautics and Astronautics, Nov. 12, 1980.
- "Component Cost Analysis of Linear Systems," Michigan State University, Feb. 26, 1981.
- Col5 "Control Design of Flexible Spacecraft," University of Michigan, Nov. 12, 1981.
- Col6 "Model Reduction & Controller Design," NASA Langley Large Space Systems Tech. Workshop June, 1979.
- Col7 "Control of Flexible Vehicles," Univ. of Stuttgart, MECHANIC SEMINAR, Stuttgart, Germany, June 1, 1982.
- Col8 "Towards a Unification of the Modeling and Control Problems," Lawrence Livermore Lab, University California, Sept. 28, 1984.
- Col9 "Dynamics and Control of Flexible Structures," Stevens Institute of Tech., Hoboken, NJ, Nov. 5, 1984.
- Col10 "Modeling and Control Strategies for Flexible Space Structures," Massachusetts Institute

- of Technology, Department of Aerospace Engineering, Nov. 6, 1984.
- Col11 "Modeling and Control of Flexible Spacecraft," NASA Langley Research Center, Nov. 30, 1984.
- Col12 "Introduction to Covariance Control," The Australian National University, Canberra, May 7, 1985.
- Col13 "A Perspective on Controller Reduction," The Australian Nat'l. Univ., Canberra, Jan. 31, Feb. 7, 1985.
- Col14 "Model Reduction to Preserve Covariances," The Australian National Univ., Canberra, Mar. 18, 1985.
- Col15 "Covariance Equivalent Realizations for Discrete-Time Systems," The Australian National University, Canberra, Mar. 4, 1985.
- Col16 "On the Structure of Modeling Errors," The Australian National University, Canberra, Mar. 26, 1985.
- Col17 "Dynamics and Control of Flexible Structures," University of Washington, Seattle, July 2, 1985.
- Col18 "Covariance Equivalent Model Reduction," Univ. of Newcastle, Newcastle, Australia, Feb. 14, 1985.
- Col19 "Recent Developments in Model Reduction," Univ. of Strathclyde, Glasgow, Scotland, June 5, 1985.
- Col20 "Covariance Approximation and Control," University of Illinois, EE Department, Oct. 7, 1985.
- Col21 "An Introduction to Covariance Control Theory," Univ. of Michigan, Ann Arbor, MI, Oct. 15, 1985.
- Col22 "Model Reduction of Linear Systems," University of Toledo, Toledo, Ohio, Oct. 14, 1985.
- Col23 "Multi-objective Control of Large Space Structures," Kobe University, Koe, Japan, Mar. 13, 1986.
- Col24 "Sensor/Actuator Selection in Large Space Structures," Kyoto University, Kyoto, Japan, Mar. 15, 1986.
- Col25 "Covariance Control of Large Space Structures," Nagoya University, Nagoya, Japan, Mar. 18, 1986.

- Col26 "Dynamics and Control of Flexible Structures," National Aerospace Laboratory, Mar. 19, 1986.
- Col27 "Modeling and Control of Flexible Spacecraft," Univ. of Osaka Prefecture, Japan, Mar. 24, 1986.
- Col28 "Model Reduction and the Q-Markov Cover Method," Osaka University, Osaka, Japan, Mar. 28, 1986.
- Col29 "Model Reductions by Projections: Preserving 4 Properties of a Higher Order System," Australian National University, Canberra, Aug. 6, 1987.
- Col30 "Controller Reduction Combining Canonical Correlation Analysis and Q-Markov COVERS," Australian National University, Canberra, Aug. 11, 1987.
- Col31 "Linear Discrete-Time Systems: Realizations from Input-Output Data," Australian National University, Canberra, Aug. 13, 1987.
- Col32 "A Generalized Approach to Q-Markov COVERS for Discrete Systems," Australian National University, Canberra, Aug. 20, 1987.
- Col33 "Covariance Control of Flexible Structures," UC Irvine, Irvine, CA, Jan. 30, 1989.
- Col34 "Control of Flexible Structures," Georgia Institute of Technology, Atlanta, GA, Feb. 16, 1987.
- Col35 "Model Reductions Using a Projection Formulation," Univ. of Michigan, Ann Arbor, Apr. 12, 1988.
- Col36 "Dynamics and Control of Flexible Structures," Arizona State University, Tempe, AZ, Nov. 3, 1987.
- Col37 "Structural Perturbations of Dynamic Systems Via Cost-Decomposition Methods," Illinois Institute of Technology, Chicago, IL, Feb. 4, 1982.
- Col38 "Q-Cover Concepts in Control System Design," Aerospace Corporation, Los Angeles, Jan. 9, 1985.
- Col39 "On the Control of Flexible Structures," University of Illinois, Urbana, IL, Apr. 28, 1986.
"Dynamics and Control of Flexible Structures," University of California at Irvine, Jan. 30, 1989.
- Col40 "Covariance Controllers for Flexible Structures," Ohio State University, May 5, 1989.
- Col41 "Multiobjective and Covariance Control," Johns Hopkins University, Oct. 19, 1989.

- Col42 “Lyapunov and Covariance Controllers,” Oct. 7-Nov. 1, 1991, Springer Professor Lectures, UC Berkeley.
- Col43 “Covariance Control,” DLR, 1992, Oberpfaffenhofen, Germany.
- Col46 “Integrated Modeling and Control for Flexible Structures,” DLR, 1992, Oberpfaffenhofen, Germany.
- Col47 “Covariance Control and the Routh Test,” EE Department, Zurich, Switzerland, 1992.
- Col48 “Integrated Modeling and Control for Flexible Structures,” ME Department, Zurich, Switzerland, 1992.
- Col49 “Covariance Control,” University Copenhagen, Denmark, 1992.
- Col50 “A Finite Step Algorithm for Covariance Control,” Eindhoven University, Netherlands.
- Col51 “Linear Controllers with Output Feedback (LMI Approaches),” Nov. 23, 1993, Universidade Estadual de Campinas, Brazil.
- Col52 “Low-Order Control Design for LMI Problems Using Alternating Projection Methods,” Nov. 26, 1993, Universidade Estadual de Campinas, Brazil.
- Col53 “An Integrated Approach to Combine Plant and Controller Design,” Feb. 11, 1994, University of Michigan.
- Col54 “Equivalent Models and Equivalent Control Problems,” Oct. 19, 1995, Invited Lecture, University of Notre Dame, Notre Dame IN.
- Col55 “Robust Control for Electro-Mechanical Systems,” April 4, 1996, Invited Lecture, University of California, San Diego, CA.
- Col56 “Robust Control for Electro-Mechanical Systems,” April 24, 1996, University of Illinois, Champaign-Urbana, IL.

Invited Short Courses:

- Skelton, R.E., “Rotational Dynamics I,” short course for Sperry Rand Corp., Huntsville, AL, Apr. 1970.
- Skelton, R.E., “Rotational Dynamics II,” short course for Sperry Rand Corp., Huntsville, AL, May 1970.
- Skelton, R.E., “Modern Control Theory and Applications,” short course for Sperry Rand Corp., Huntsville, AL, Apr. 1972.

Skelton, R.E., "Dynamic Programming," short course for Sperry Rand Corp., Huntsville, AL, May 1973.

Skelton, R.E., "Linear System Theory," short course for Sperry Rand Corp., Huntsville, AL, June 1973.

Skelton, R.E., and P.W. Likins, "Dynamics and Control of Flexible Spacecraft," short course sponsored by AIAA, Los Angeles, Sept. 30-Oct. 1, 1978.

Skelton, R.E., and P.W. Likins, "Dynamics and Control of Flexible Spacecraft," short course sponsored by AIAA, Provincetown, Massachusetts, June 28-29, 1979.

Skelton, R.E., and P.W. Likins, "Dynamics and Control of Flexible Spacecraft," UCLA short course, July 28-Aug. 1, 1980.

Skelton, R.E., "Dynamics and Control of Flexible Spacecraft," short course sponsored by US Air Force, Wright Patterson Air Force Base, July 10-11, 1980.

Skelton, R.E., and P.C. Hughes, "Dynamics and Control of Flexible Structures," short course for McDonnell Douglas Aerospace Co., St. Louis, MO, July 9-11, 1981.

Skelton, R.E., and P.C. Hughes, "Dynamics and Control of Flexible Structures," short course for Eastman Kodak Co., Rochester, NY, June 8-11, 1981.

Skelton, R.E., P.C. Hughes, and H.T.Y. Yang, "Dynamics and Control of Flexible Structures," UCLA short course, July 20-24, 1981.

Skelton, R.E., "Beneficial Interactions of the Dynamics Guidance and Control Disciplines," Lecture series for the American Astronautical Society Annual Rocky Mountain Guidance & Control Conf., Jan. 30, 1982.

Skelton, R.E., P.C. Hughes, "Dynamics and Control of Flexible Structures," UCLA short course, Aug. 22-26, 1983.

Skelton, R.E., "Dynamics and Control of Flexible Space Structures," short course, Honeywell, Inc., Clearwater, FL, Dec. 3-7, 1984.

Goodwin, G., R.E. Skelton, and D.L. Mingori, "Control Theory for Modern Mechanical and Aerospace Applications," UCLA, Jan. 7-11, 1985.

Skelton, R.E., "Control of Flexible Structures," Carl-Cranz Gesellschaft e.V., Flugplatz, Wessling-Oberpfaffenhofen, Germany, June 9-11, 1986.

Skelton, R.E., "Dynamics and Control of Flexible Structures," Lawrence Livermore National Laboratory, Livermore, CA, July 13-18, 1986.

Skelton, R.E., "Control Structure Interaction," Sandia National Labs, Jan. 26-30, 1987.

Skelton, R.E., "Dynamics and Control of Flexible Structures," Edwards Air Force Base, June 22-26, 1987.

Skelton, R.E., "Optimal Estimation and Control," JPL.

Skelton, R.E., "Flexible Structure Control," European Space Agency, April 1992, short course.

Skelton, R.E., "Grigoriadis, "Integrated Structure and Control Design", short course for ACC, Philadelphia, 1998.

Skelton, R.E., Iwasaki, Grigoriadis, "System Design", Plant and Control, 1999, ACC.