

Douglas G. MacMartin*

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Research Interests

Interdisciplinary application of feedback analysis and control with current focus on (i) climate dynamics, including geoengineering and climate variability, and (ii) modeling and control design for the Thirty Meter Telescope; interests also include vibration, noise, and flow control.

Education

- Ph.D. (1992) Massachusetts Institute of Technology, Dept. of Aeronautics and Astronautics. Major in controls; minor structural dynamics. Thesis topic: "A Stochastic Approach to Broadband Control of Parametrically Uncertain Structures".
- S.M. (1990) Massachusetts Institute of Technology, Dept. of Aeronautics and Astronautics.
- B.A.Sc. (1987) University of Toronto, Engineering Science, Aerospace option.

Professional Experience

- 2014-present Research Professor of Computing and Mathematical Sciences, California Institute of Technology.
- 2015-present Senior Research Associate, Mechanical & Aerospace Engineering, Cornell University
- 2008-2014 Senior Research Associate, Computing + Mathematical Sciences (formerly in Control & Dynamical Systems), California Institute of Technology.
- 2008-2014 Visiting investigator, Carnegie Institution for Science (Dept. Global Ecology).
- 2010 Guest researcher at Lund University, Department of Astronomy.
- 2006 Visiting Scientist, University of New South Wales and University of Adelaide.
- 2002-2008 Senior Research Fellow, Department of Control & Dynamical Systems, Caltech.
- 2000-2002 Visiting Associate, Department of Control & Dynamical Systems, Caltech.
- 1994-2000 Flow Control Program Manager (99-00), Active Control Theme Leader (96-99), and Senior Research Engineer (94-96), United Technologies Research Center.
- 1993-1994 Assistant Research Officer, Institute for Aerospace Research, National Research Council of Canada.
- 1992-1993 Postdoctoral Fellow, Department of Aeronautics and Astronautics, MIT.
- 1987-1992 Research Assistant, Department of Aeronautics and Astronautics, MIT.

* Formerly *Douglas MacMynowski*

Honours and Awards

- Faculty Fellow, Atkinson Center for a Sustainable Future
- Associate Fellow, AIAA
- AACC O. Hugo Schuck Best Paper, Applications, 2011 American Control Conference.
- Guest researcher, Lund University, Dept. Astronomy, 2010.
- UTRC Leadership Council, 1996-2000.
- UTRC Outstanding Achievement Awards for technical contributions in helicopter cabin active noise control for laboratory demonstration and successful flight test, 1994 and 1996.
- NASA Certificate of Appreciation for support of the development and flight of the Middeck Active Control Experiment, 1995
- Barbara Zdasiuk Medal for highest graduating average in Eng. Science, U. Toronto, 1987.
- Canadian Aeronautics and Space Institute (CASI) student award, Toronto branch, 1987.

Professional Service

- Member, American Geophysical Union (AGU), and Associate Fellow, AIAA.
- Member, AIAA Fluid Dynamics Technical Committee 2002-2006, member of Flow Control Architecture and Algorithms sub-committee, and lead editor of document clarifying flow control nomenclature to improve communications between fluids and control researchers.
- Treasurer, AIAA Guidance, Navigation and Control Technical Committee, 1998-2004.
- Area chair for “*Control and Dynamics of Flexible Structures*”, AIAA Guidance, Navigation and Control Conf., 2001-2002 and co-chair/chair for “*Multidisciplinary Control*”, 2003-2004.
- Co-organizer of “*Climate Feedbacks and Climate Dynamics*”, 2004 AGU fall meeting.
- External review panel member for JPL SMAP dynamics (Soil Moisture Active & Passive mission), and for ESO E-ELT (European Extremely Large Telescope) construction proposal.
- Have been a reviewer for over 25 different journals spanning aerospace, controls, fluids, telescope design and climate dynamics and change; also served on ACC O. Hugo Schuck best paper committee and several AIAA best paper committees.

Recent Research Support

- *Geoengineering on a Regional Scale* (Atkinson Academic Venture Fund, Cornell), 2016-17
- *A Rigorous Evaluation of the Potentials and the Limitations of Climate Perturbations Using Systems Engineering Approaches*, (DARPA-DSO), 2015 (w/ Kravitz, PNNL)
- *Variability, stochastic dynamics, and compensating model errors of the Atlantic Meridional Ocean Circulation in coupled IPCC models*, (NOAA), 2013-2016 (w/ Penland, Tziperman).
- *Monitoring of geo-engineering effects and their natural and anthropogenic analogues*, (Keck Institute of Space Studies), 2011-2012
- *Improving Inter-annual Prediction Skill in a Changing Climate via the Identification of Compensating Coupled Model Error* (DOE), 2010-2013. (With Eli Tziperman, Harvard.)
- *Geoengineering Controllability* (Fund for innovative climate & energy research), 2008-2011.
- *Closed Loop Control of Vortex Formation* (AFOSR MURI), 2005-2010. PI: Tim Colonius, joint between Caltech, Princeton, Northeastern, IIT.
- *Climate: Complex system, simple behavior* (McDonnell fndn), 2003-2007. (w/ E. Tziperman)
- *Design Development* (2004-2009) and *Early Construction* (2009-20xx) of TMT (Moore fndn).

- *Conceptual design of the California Extremely Large Telescope* (Caltech Board), 2000-2003.
- *Integrated Control of Inlet/Compression Systems, & Actively Stabilized Isentropic Supersonic Inlet* (DARPA Micro-Adaptive Flow Control and Quiet Supersonic Platform projects), 2000-2002. Joint project between MIT, Caltech, NASA Glenn, and Northrop Grumman.
- UTRC funding: DARPA (separation control), National Rotorcraft Tech. Center and Sikorsky (noise control), Pratt & Whitney (externals & controls management, eddy current inspection), and internal UTRC (active control leadership, flow control, noise control).

Teaching

- Cornell:
 - MAE 4780/5780 (2015) *Feedback Control Systems*; undergraduate/graduate introductory controls
- Caltech:
 - CDS 110a/101 (2009–14; and co-instructor, 2003, 2008), *Analysis and Design of Feedback Systems*; undergraduate/graduate introductory controls and feedback analysis. (Typical combined enrollment 65-70, including engineers, biologists, etc.)
 - CDS 110b (2004–05, 2009–11) *Introduction to Control Theory*; undergraduate/graduate 2nd controls class covering estimation, optimal control, and robustness.
 - CDS 111 (2001–2004) *Applications of Control*; undergraduate/graduate class focused on laboratory implementation of control designs.
 - CDS140a/ACM101/AM125b (co-instructor 2013) *Differential equations, dynamical systems*
 - CDS 140b (2012, co-taught 2014) *Introduction to Dynamics*; nonlinear dynamics and control
 - Ae240 (co-instructor, 2009, guest lectures 2012, 2013) *Closed-loop Flow Control*.

Advisees

- PhD: John Carson III (2009, co-advised with R. Murray)
- Postdoctoral: Tait Pottebaum (2003-04), Ben Kravitz (de facto, 2011-2012)

Publications

Statistics (Google-scholar):

Citations: 1535, h-index: 20, i-10 index: 48 (as of 8/21/15)

Patents:

- P5. Welsh, W. A., MacMartin, D. G., Finn, A. M.; “System for computationally efficient active control of tonal sound or vibration”, US Patent 7,224,807, May 29, 2007.
- P4. Millott, T. A., MacMartin, D. G., Goodman, R. K., Fuller, J. W.; “Computationally efficient means for optimal control with control constraints”, US Patent 7,197,147, Mar 27, 2007.
- P3. MacMartin, D. G., Welsh, W. A., Fuller, J. W.; “System for computationally efficient adaptation of active control of sound or vibration”, United States Patent 7,003,380, Feb. 21, 2006.
- P2. Millott, T. A., MacMartin, D. G., Park, C. G., “Adaptation performance improvements for active control of sound or vibration”, (continuation) US Patent 6,856,920, Feb 15, 2005.
- P1. Millott, T. A., MacMartin, D. G., Park, C. G., “Adaptation performance improvements for active control of sound or vibration”, US Patent 6,772,074 Aug. 3, 2004.

Book Chapters:

- B2. MacMynowski, D.G. and D. Williams, “Flow Control Terminology”, *Fundamentals and Applications of Modern Flow Control*, (Chapter 3) AIAA, 2009.
- B1. Williams, D. and MacMynowski, D. G., “A Brief History of Flow Control”, *Fundamentals and Applications of Modern Flow Control*, (Chapter 1) AIAA, 2009.

Journal Articles:

- J51. Kravitz, B., D. G. MacMartin, H. Wang, and P. J. Rasch, “Geoengineering as a design problem”, *Earth System Dynamics Discussion (under review, Earth System Dynamics)*, 2015. [doi:10.5194/esdd-6-1635-2015](https://doi.org/10.5194/esdd-6-1635-2015)
- J50. MacMartin, D.G., L. Zanna, and E. Tziperman, “Suppression of AMOC variability at increased CO₂” *submitted*.
- J49. Kravitz, B., D. G. MacMartin, P. J. Rasch, and A. J. Jarvis, “A new method of comparing climate forcing agents”, *in press, J. Climate*, 2015.
- J48. MacMartin, D. G., and H. Thompson, “A vibration budget for observatory equipment”, *SPIE J. Astronomical Telescopes, Instruments, and Systems*, 1 (3), 034005 (September 16, 2015). doi: [10.1117/1.JATIS.1.3.034005](https://doi.org/10.1117/1.JATIS.1.3.034005)
- J47. MacMartin, D. G., B. Kravitz, and P. J. Rasch, “On solar geoengineering and climate uncertainty”, *Geophysical Research Letters*, **42**, 2015. doi:[10.1002/2015GL065391](https://doi.org/10.1002/2015GL065391).
- J46. Cvijanovic, I., K. Caldeira, and D. G. MacMartin, “Impacts of ocean albedo alteration on Arctic sea ice restoration and Northern Hemisphere climate”, *Environmental Research Letters*, **10**(4), 2015. doi: [10.1088/1748-9326/10/4/044020](https://doi.org/10.1088/1748-9326/10/4/044020)
- J45. Keith, D. W., and D. G. MacMartin “A temporary, moderate, and responsive scenario for solar geoengineering”, *Nature Climate Change*, **5**, March 2015. doi:[10.1038/nclimate2493](https://doi.org/10.1038/nclimate2493)

- J44. Keith, D. W., R. Duren and D. G. MacMartin, "Field experiments on Solar Geoengineering: An exploration of a representative research portfolio", *Phil. Trans. Royal Soc. A.*, **372**(2031), 2014. [doi: 10.1098/rsta.2014.0175](https://doi.org/10.1098/rsta.2014.0175)
- J43. MacMartin, D. G., K. Caldeira, and D. W. Keith, "Solar geoengineering to limit rates of change", *Phil. Trans. Royal Soc. A.*, **372**(2031), 2014. [doi:10.1098/rsta.2014.0134](https://doi.org/10.1098/rsta.2014.0134)
- J42. Kravitz, B., D. G. MacMartin, A. Robock, P.J. Rasch, K.L. Ricke, J.N.S. Cole, C.L. Curry, P.J. Irvine, D. Ji, D. W. Keith, J.E. Kristjánsson, J.C. Moore, H. Muri, B. Singh, S. Tilmes, S. Watanabe, S. Yang, and J.-H. Yoon, "A multi-model assessment of regional climate disparities caused by solar geoengineering", *Environmental Research Letters*, **9**(7), 2014. [doi:10.1088/1748-9326/9/7/074013](https://doi.org/10.1088/1748-9326/9/7/074013)
- J41. Linz, M., Tziperman, E., and MacMartin, D. G., "Process-based analysis of climate model ENSO simulations: Intermodel consistency and compensating errors", *J. Geophysical Research: Atmospheres*, **119**(12):7396-7409, 2014. [doi: 10.1002/2013JD021415](https://doi.org/10.1002/2013JD021415)
- J40. MacMartin, D. G. and Tziperman, E., "Using transfer functions to quantify ENSO dynamics in data and models", *Proc. Royal Soc. A.*, **470** (2169):20140272, 2014. [doi:10.1098/rspa.2014.0272](https://doi.org/10.1098/rspa.2014.0272)
- J39. Kravitz, B., MacMartin, D. G., Leedal, D. T., Rasch, P. J., and Jarvis, A. J., "Explicit feedback and the management of uncertainty in meeting climate objectives with solar geoengineering", *Environmental Research Letters*, **9**(4), 2014. [doi:10.1088/1748-9326/9/4/044006](https://doi.org/10.1088/1748-9326/9/4/044006)
- J38. MacMartin, D. G., Kravitz, B., Keith, D. W., and Jarvis, A., "Dynamics of the coupled human-climate system resulting from closed-loop control of solar geoengineering", *Climate Dynamics*, **43**(1-2): 243-258, 2014. ([doi: 10.1007/s00382-013-1822-9](https://doi.org/10.1007/s00382-013-1822-9))
- J37. MacMartin, D. G., Thompson, P., Colavita, M. M., Sirota, M. J., "Dynamic analysis of the active-controlled segmented mirror of the Thirty Meter Telescope", *IEEE Transactions on Control Systems Technology*, **22**(1): 58-68, 2014. ([doi:10.1109/TCST.2013.2240456](https://doi.org/10.1109/TCST.2013.2240456))
- J36. MacMartin, D. G., Tziperman, E., and Zanna, L., "Frequency domain multi-model analysis of the response of Atlantic meridional overturning circulation to surface forcing", *J. Climate*, **26**(21): 8323-8340, 2013. ([doi: 10.1175/JCLI-D-12-00717.1](https://doi.org/10.1175/JCLI-D-12-00717.1))
- J35. Robock, A., MacMartin, D.G., Duren, R., and Christensen, M.W., "Studying geoengineering with natural and anthropogenic analogs," *Climatic Change*, **121**(3): 445-458, 2013. ([doi: 10.0007/s10584-013-0777-5](https://doi.org/10.0007/s10584-013-0777-5))
- J34. Carson III, J. M., Açıkmüşe, B., Murray, R. M., and MacMartin, D. G., "A Robust Nonlinear Model Predictive Control Algorithm Augmented with a Safety Mode", *Automatica*, **49**(5):1251-1260, 2013. ([doi:10.1016/j.automatica.2013.02.025](https://doi.org/10.1016/j.automatica.2013.02.025))
- J33. MacMartin, D.G., Keith, D. W., Kravitz, B., and Caldeira, K., "Management of tradeoffs in geoengineering through optimal choice of non-uniform radiative forcing", *Nature Climate Change*, **3**:365-368, 2013. ([doi: 10.1038/nclimate1722](https://doi.org/10.1038/nclimate1722))
- J32. Kravitz, B., MacMartin, D. G., and Caldeira, K., "Geoengineering: Whiter skies?" *Geophysical Research Letters*, **39**, L11801, 2012. ([doi:10.1029/2012GL051652](https://doi.org/10.1029/2012GL051652))
- J31. MacMynowski, D. G., "Control of a hypersegmented space telescope", *AIAA J. Guidance, Control and Dynamics*, **35**(3), 2012. ([doi: 10.2514/1.55428](https://doi.org/10.2514/1.55428))
- J30. MacMynowski, D. G., Roberts Jr., L. C., Shelton, J. C., Chanan, G. and Bonnet, H. "In-plane effects on segmented mirror control", *Applied Optics*, **51**(12):1929-1938, 2012. ([doi:10.1364/AO.51.001929](https://doi.org/10.1364/AO.51.001929))
- J29. Heimsten, R. Owner-Peterson, M., Ruppel T., MacMynowski, D. G. and Andersen, T., "Suppressing low-order eigenmodes with local control for deformable mirrors", *Optical Engineering* **51**(2), 026601, 2012. ([doi: 10.1117/1.OE.51.2.026601](https://doi.org/10.1117/1.OE.51.2.026601))
- J28. Heimsten, R., MacMynowski, D. G, Andersen, T. and Owner-Peterson, M., "Concept, modeling, and performance prediction of a low-cost large deformable mirror", *Applied Optics*, **51**(5):515:524, 2012.

- J27. MacMynowski, D. G., Keith, D., Caldeira, K., and Shin, H.-J., "Can we test geoengineering?" *Royal Soc. J. Energy & Environmental Science*, **4**(12), pp 5044-5052, 2011. ([doi: 10.1039/C1EE01256H](https://doi.org/10.1039/C1EE01256H))
- J26. MacMynowski, D. G., Shin, H.-J., and Caldeira, K., "The frequency response of temperature and precipitation in a climate model" *Geophysical Research Letters*, **38**, L16711, 2011. ([doi:10.1029/2011GL048623](https://doi.org/10.1029/2011GL048623))
- J25. MacMynowski, D. G., Heimsten, R., and Andersen, T. "Distributed force control of deformable mirrors", *European J. Control*, Vol. 17, No. 3, pp. 249-260, 2011. ([doi: 10.3166/ejc.17.249-260](https://doi.org/10.3166/ejc.17.249-260))
- J24. Joe, W. T., Colonius, T., and MacMynowski, D. G., "Feedback control of vortex shedding from an inclined flat plate", *Theoretical and Computational Fluid Dynamics*, **25**, 2011. ([doi:10.1007/s00162-010-0204-8](https://doi.org/10.1007/s00162-010-0204-8)).
- J23. MacMynowski, D. G. and Tziperman, E., "Testing and improving ENSO models by process using transfer functions", *Geophysical Research Letters*, **37**, L19701, 2010. ([doi:10.1029/2010GL044050](https://doi.org/10.1029/2010GL044050)).
- J22. MacMynowski, D. G. and Andersen, T., "Wind buffeting of large telescopes", *Applied Optics*, **49**(4), pp. 625-636, 2010. ([doi:10.1364/AO.49.000625](https://doi.org/10.1364/AO.49.000625))
- J21. MacMynowski, D. G. "Can we control El Niño?" *Environmental Research Letters*, **4**, 2009. ([doi:10.1088/1748-9326/4/4/045111](https://doi.org/10.1088/1748-9326/4/4/045111))
- J20. MacMynowski, D.G., "Interaction matrix uncertainty in active (and adaptive) optics", *Applied Optics*, Vol. 48, No. 11, pp. 2105-2114, 2009. ([doi:10.1364/AO.48.002105](https://doi.org/10.1364/AO.48.002105))
- J19. Lessard, L. A., D. G. MacMynowski, M. West, A. Bouchez, and S. Lall, "Experimental validation of single-iteration multigrid wavefront reconstruction at the Palomar Observatory", *Optics Letters*, Vol. 33, No 18, pp 2047-2049, 2008. ([doi: 10.1364/OL.33.002047](https://doi.org/10.1364/OL.33.002047))
- J18. Lessard, L. A., M. West, D. G. MacMynowski and S. Lall, "Warm-started wavefront reconstruction for adaptive optics", *J. Optical Society of America (A)*, Vol. 25, No. 5, pp. 1147-1155, 2008. ([doi: 10.1364/JOSAA.25.001147](https://doi.org/10.1364/JOSAA.25.001147))
- J17. MacMynowski, D.G. and E. Tziperman, "Factors affecting ENSO's Period", *J. Atmospheric Sciences*, Vol. 65, No. 5, pp. 1570-1586, 2008. ([doi: 10.1175/2007JAS2520.1](https://doi.org/10.1175/2007JAS2520.1))
- J16. MacMynowski, D. G. and E. Tziperman, "Two-Way Feedback Interaction between the Thermohaline and Wind-Driven Circulations", *J. Physical Oceanography*, Vol. 36, No. 5, pp. 914-929, 2006.
- J15. MacMynowski, D. G., K. Vogiatzis, G. Z. Angeli, J. Fitzsimmons, and J. E. Nelson, "Wind Loads on Ground-Based Telescopes", *Applied Optics*, Vol. 45, No. 30, pp. 7912-7923, 2006.
- J14. Pottebaum, T. and MacMynowski, D. G., "Buffeting of Large Telescopes: Wind Tunnel Measurements of Flow in a Generic Enclosure", *J. Fluids and Structures*, Vol. 22, 2006, pp. 3-19.
- J13. Rowley, C. W., D. R. Williams, T. Colonius, R. M. Murray, and D. G. MacMynowski, "Linear Models for Control of Cavity Flow Oscillations", *J. Fluid Mech.* Vol. 547, 2006, pp. 317-330.
- J12. MacMynowski, D. G., "Hierarchic Estimation for Control of Segmented-Mirror Telescopes", *AIAA J. Guidance, Control and Dynamics*, Vol. 28, No. 5, Sept.-Oct. 2005.
- J11. MacMartin, D. G. "Dynamics and Control of Shock Motion in a Near-Isentropic Inlet", *AIAA J. Aircraft*, Vol. 41, No. 4, July-Aug. 2004, pp. 846-853.
- J10. Chanan, G., MacMartin, D. G., Nelson, J., and Mast, T., "Control and Alignment of Segmented-Mirror Telescopes: Matrices, Modes and Error Propagation", *Applied Optics*, Vol. 43, No. 6, February 2004, pp. 1223-1232.
- J9. MacMartin, D. G. and Chanan, G., "Measurement Accuracy in Control of Segmented-Mirror Telescopes", *Applied Optics*, Vol. 43, No. 3, January 2004, pp. 608-615.
- J8. MacMartin, D. G., "Local, Hierarchic, and Iterative Reconstructors for Adaptive Optics", *J. of the Optical Society of America (A)*, Vol. 20, No. 6, June 2003, pp. 1084-1093.

- J7. MacMartin, D. G., "Collocated Structural Control for Reduction of Aircraft Cabin Noise," *Journal of Sound and Vibration*, Vol. 190, No. 1, 1996, pp. 105-119.
- J6. MacMartin, D. G., Basso, G. L., and Slingerland, F. W., "Aircraft Fuselage Noise Transmission Measurements using a Reciprocity Technique," *Journal of Sound and Vibration*, Vol. 187, No. 3, 1995, pp. 467-483.
- J5. Grocott, S. C. O., How, J. P., Miller, D. W., MacMartin, D. G., and Liu, K., "Robust Control Design and Implementation on the Middeck Active Control Experiment," *AIAA Journal of Guidance, Control, and Dynamics*, Vol. 17, No. 6, Nov.-Dec. 1994, pp. 1163-1170.
- J4. MacMartin, D. G. and Hall, S. R., "Broadband Control of Flexible Structures using Statistical Energy Analysis Concepts," *AIAA Journal of Guidance, Control and Dynamic*, Vol. 17, No. 2, March-April 1994, pp. 361-369.
- J3. Hall, S. R., MacMartin, D. G., and Bernstein, D. S., "Covariance Averaging in the Analysis of Uncertain Systems," *IEEE Trans. on Automatic Control*, Vol. 38, No. 12, Dec. 1993, pp. 1858-1862.
- J2. MacMartin, D. G. and Hall, S. R., "Structural Control Experiments using an H_∞ Power Flow Approach," *Journal of Sound and Vibration*, Vol. 148, No. 2, July 1991, pp. 223-241.
- J1. MacMartin, D. G. and Hall, S. R., "Control of Uncertain Structures using an H_∞ Power Flow Approach," *AIAA J. Guidance, Control, and Dynamics*, Vol. 14, No. 3, May-June 1991, pp. 521-530.

Conference Papers:

- C72. Angeli, G.Z., B. Xin, C. F. Claver, D. G. MacMartin, D. Neill, M. C. Britton, J. Sebag, and S. Chandrasekharan, "Real time wavefront control system for the Large Synoptic Survey Telescope (LSST)", *Proc. SPIE 9150, Modeling, Systems Engineering, and Project Management for Astronomy VI*, 2014.
- C71. MacMartin, D. G. and Thompson, H. A., "Equipment vibration budget for the TMT", *Proc. SPIE 9145, Ground-based and Airborne Telescopes V*, 2014.
- C70. MacMartin, D. G. and Vogiatzis, K., "Unsteady wind loads for TMT: Replacing parametric models with CFD", *Proc. SPIE 9150, Modeling, Systems Engineering, and Project Management for Astronomy VI*, 2014.
- C69. Thompson, H. A., MacMartin, D. G., Byrnes, P. W. G., Tomono, D., and Terada, H. "Measuring transmission and forces from observatory equipment vibration", *Proc. SPIE 9145, Ground-based and Airborne Telescopes V*, 2014.
- C68. Roberts, S., Rogers, J., Thompson, H. A., Vogiatzis, K., MacMartin, D.G., Wilde, E., Troy, M., Seo, B.-J., and Nissly, C., "Systems engineering of the Thirty Meter Telescope for the construction phase", *Proc. SPIE 9150, Modeling, Systems Engineering, and Project Management for Astronomy VI*, 2014.
- C67. MacMartin, D. G., B. Kravitz, and D. W. Keith, "Geoengineering: the world's largest control problem", *Proceedings, American Control Conference*, pp. 2401-2406, 2014.
- C66. MacMartin, D.G., and Thompson, H., "Development of vibration source requirements for TMT to ensure AO performance", *AO4ELT3*, 2013.
- C65. MacMartin, D. G., Heimsten, R., Andersen, T., and Owner-Petersen, M., "Distributed control of large deformable mirrors", *Proc. SPIE 8447, Adaptive Optics Systems III*, 2012.
- C64. Sirota, M. J., G.Z. Angeli, D.G. MacMynowski, G.A. Chanan, M.M. Colavita, C. Lindensmith, C. Shelton, M. Troy, T.S. Mast, J. Nelson, P.M. Thompson, "An Overview of the Active Optics Control Strategy for the Thirty Meter Telescope", *Proc. 13th International Conf. Accelerator & Large Experimental Physics Control Systems*, 2011.

- C63. MacMynowski, D.G., P.M. Thompson, J. C. Shelton, L.C. Roberts, Jr., M. M. Colavita, and M. J. Sirota, "Control system modeling for the Thirty Meter Telescope primary mirror", *Proc. SPIE 8336*, 83360R (2011). (doi:10.1117/12.914941)
- C62. Heimsten, R., Andersen, T., Owner-Petersen, M. and MacMynowski, D. G., "Integrated modeling of a laboratory setup for a large deformable mirror", *Proc. SPIE 8336, Integrated Modeling of Complex Optomechanical Systems*, (2011). (doi:10.1117/12.915571)
- C61. Angeli, G.Z., Vogiatzis, K., MacMynowski, D., Seo, B.J., Nissly, C., Troy, M, and Cho, M., "Integrated modeling and systems engineering for the Thirty Meter Telescope", *Proc. SPIE 8336, Integrated Modeling of Complex Optomechanical Systems*, 2011. (doi: 10.1117/12.919363)
- C60. MacMynowski, D. G. and M. Björklund, "Large Aperture Segmented Space Telescope (LASST): Can we control a 12000 segment mirror?" *American Control Conference*, 2011.
- C59. MacMynowski, D. G., "Controlling Chaos in El Niño", *American Control Conference*, 2010.
- C58. MacMynowski, D. G., Colavita, M. M., Skidmore, W., and Vogiatzis, K., "Primary mirror dynamic disturbance models for TMT: Vibration and wind", *SPIE 7738, Modeling, Systems Engineering, and Project Management for Astronomy IV*, 2010.
- C57. MacMynowski, D. G., Thompson, P. T., Shelton, C., and L. C. Roberts, Jr., "Robustness of the Thirty Meter Telescope primary mirror control system", *SPIE 7733, Ground-based and Airborne Telescopes III*, 2010.
- C56. Thompson, P. T., MacMynowski, D. G., Regehr, M. W., Colavita, M. M., and Sirota, M. J., "Servo design and analysis for the Thirty Meter Telescope primary mirror actuators", *SPIE 7733, Ground-based and Airborne Telescopes III*, 2010.
- C55. Heimsten, R., MacMynowski, D. G., and Andersen, T., "Progress Developing of a Low-Cost Large Deformable Mirror", *SPIE 7736, Adaptive Optics Systems II*, 2010.
- C54. Joe, W. T., Colonius, T. and MacMynowski, D. G. "Optimized waveforms for feedback control of vortex shedding", *Active Flow Control II*, (Springer Berlin/Heidelberg) pp. 391-404. 2010.
- C53. Keas, P. and MacMynowski, D. G. "Adaptive spatial filtering for aeroservoelastic response suppression", *invited paper, AIAA Atmospheric Flight Mechanics Conf.*, 2009. AIAA 2009-5709.
- C52. Joe, W. T., Colonius, T., and MacMynowski, D. G., "Optimized control of vortex shedding from an inclined flat plate", *AIAA Fluid Dynamics Conf.*, 2009. AIAA 2009-4027.
- C51. Seo, B.-Y., Nissly, C., Angeli, G., MacMynowski, D., Sigrist, N., Troy, M., and Williams, E., "Investigation of Primary Mirror Segment's residual errors for the Thirty Meter Telescope", *SPIE 7427, Optical Modeling and Performance Predictions IV*, 2009.
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- C3. MacMartin, D. G., Hall, S. R., and Mustafa, D., "On a Cost Functional for H_2/H_∞ Minimization," *IEEE Conference on Decision and Control*, Dec. 1990, pp. 1010-1012.
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Other Publications:

- O2. MacMartin, D., and B. Kravitz, "Geoengineering the Earth's Climate: The World's Largest Control Problem", in *The Impact of Control Technology, 2nd Ed.*, IEEE, 2014.
- O1. Philander, S. G. updated for 2nd edition by D. MacMynowski, "El Niño, La Niña, and the Southern Oscillation", *Encyclopedia of Climate and Weather, 2nd ed.*, Oxford University Press, 2011
- T2. MacMartin, D. G., *A Stochastic Approach to Broadband Control of Parametrically Uncertain Structures*, Ph.D. thesis, Dept. of Aeronautics and Astronautics, M.I.T., Cambridge, MA, June 1992.
- T1. MacMartin, D. G., *An H_∞ Power Flow Approach to Control of Uncertain Structures*, Master's thesis, Department of Aeronautics and Astronautics, M.I.T., Cambridge, MA, Feb. 1990.

Recent Invited lectures

- Beijing Normal University (Global Change & Earth System Science), 8/27/15, *Designing Geoengineering*
- Hammer Museum, People's UN, 5/2/15, *Climate Change & Climate Engineering*
- Caltech (Resnick Institute), 4/28/15, *Solar Geoengineering & Climate Risks*
- Yale (Climate & Energy Institute), 4/23/15, *Solar Geoengineering: Design and Challenges*
- Cornell (MAE), 1/27/15, *Geoengineering: the World's largest control challenge*
- MIT (EAPS, MASS seminar), 10/14/14, *Frequency domain analysis of ENSO & AMOC variability*
- Caltech (IST Seminar), 10/29/13, *"Geoengineering Earth's climate: the world's largest control problem"*
- UC Irvine (Earth System Science), 1/30/13, *"Putting engineering into geoengineering: Dynamics, optimization and control"*
- U. Minnesota (Aerospace Eng.), 10/21/11, *"Control of the Thirty Meter Telescope"*
- Caltech (Yuk Yung GPS seminar), 4/14/11, *"Can we test geoengineering?"*
- Princeton (Mech. & Aerospace Eng.), 10/15/10, *"From El Nino to geoengineering: applications of feedback analysis tools to climate problems"*
- U. Maryland (Aerospace Eng.), 10/14/10, *"From El Nino to geoengineering: applications of feedback analysis tools to climate problems"*
- Penn State (Geosciences), 10/13/10, *"Can we test geoengineering?"*
- KTH (Automatic Control Lab), 9/13/10,
"Control of future large telescopes: Control of systems with thousands of actuators"
- JPL (Controls group), 4/2/09, *"Control for the Thirty Meter Telescope"*
- Northrop Grumman (Space Technology), 2/13/09 *"Control for the Thirty Meter Telescope"*
- University of Chicago (Kavli Institute for Cosmological Physics), 12/02/2008
"Thirty Meter Telescope: Design, Performance, and Control"
- University of Illinois, Urbana-Champaign (Aerospace Eng.), 12/01/2008
"Feedback analysis and control in climate dynamics"
- European Southern Observatory, 11/21/2008, *"Control of TMT Wind Response"*
- Danish Meteorological Institute, 11/14/2008
"Applying feedback analysis tools from engineering control theory to climate dynamics"
- Lund University, Sweden (Astronomy), 11/13/2008,
"Thirty Meter Telescope Performance Modeling and Control"
- Lund University, Sweden (Dept. of Automatic Control), 11/12/2008
"Control for the Thirty Meter Telescope"
- Hertzberg Institute for Astrophysics, National Research Council of Canada, 05/05/2008
"Control of TMT Wind Response"
- UC Santa Cruz (Computer eng.), 02/25/2008, *"From Telescope Control to Climate Dynamics"*
- JPL, 02/08/2008, *"Applying feedback analysis tools from engineering control theory to climate dynamics"*
- U. Colorado, Boulder (EE) , 10/30/2007
"Applying feedback analysis tools from engineering control theory to climate dynamics"
- UC Santa Cruz (Computer engineering), 5/2/2007, *"Control for Extremely Large Telescopes"*

Stanford University, (Aero/Astro), 2/21/2007
"Applying feedback analysis tools from engineering control theory to climate dynamics"

U. New South Wales, Australia, (Math), 9/21/2006
"Applying feedback analysis tools from engineering control theory to climate dynamics"

U. New South Wales, Australia, (Inst. Environmental Studies), 9/19/2006, *"What it takes to be undisciplined: An Interdisciplinary Adventure through Government, Industry and Academia"*

U. Adelaide, (ME), 6/7/2006, *"Control for the Thirty-Meter Telescope"*

UCLA, (Atm. & Ocean Sciences), 3/18/2005
"Analysis of feedback coupling between THC and WDC using tools from control theory"

Stanford University, (Aero/Astro), 11/17/2004, *"Control for the Thirty-Meter Telescope"*

NASA Langley, 7/15/2004, *"Feedback Flow Control"*

AIAA Aerospace Sciences Conf., 1/6/2004 *"Design Tools for Synthetic Jet Separation Control"*

UCSD, (Mech. & Aero Engineering), 4/15/2003
"Dynamics and Control of Shock Motion in a Near-Isentropic Inlet"

U. Maryland (Aerospace Eng.), 9/28/2001 *"Flow Control with Applications to Aircraft Inlets"*

AFRL WPAFB, 4/27/2001, *"Integrated Control of Inlet/Compression Systems"*

NASA Glenn, 4/26/2001, *"Integrated Control of Inlet/Compression Systems"*

Consulting

- LSST (2013-15), telescope active optics analysis
- CSA Eng. (2008-09) aeroservoelasticity, (2003–04), wind-turbine vibration/noise control
- UTRC (2001–02), helicopter active noise control