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# Curriculum Vitae

## Joaquim R. R. A. Martins

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## 1 Contact Information

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## 2 Education

**Ph.D.** Aeronautics and Astronautics, Stanford University, 2002

Thesis: “A Coupled-Adjoint Method for High-Fidelity Aero-Structural Optimization”

Advisors: Prof. Juan J. Alonso and Prof. Ilan M. Kroo

**M.Sc.** Aeronautics and Astronautics, Stanford University, 1997

Project: “Drag Reduction of Staggered Supersonic Wings” Advisor: Prof. Ilan M. Kroo

**M.Eng.** Aeronautics, Imperial College, London, UK, 1995

Thesis: “Self-Similar Solutions for the Plane Turbulent Jet”. Research performed in the Faculty of Aerospace Engineering at Technion — Israel Institute of Technology, Haifa, Israel

Advisors: Prof. Micha Wolfshtein and Prof. Richard Hillier

## 3 Professional Experience

**Professor**, University of Michigan, Department of Aerospace Engineering, Ann Arbor, MI, Sep 2016–present

**Associate Professor**, University of Michigan, Department of Aerospace Engineering, Ann Arbor, MI, Sep 2009–Aug 2016

**Associate Professor**, University of Toronto Institute for Aerospace Studies, Toronto, ON, Canada, Jul 2008–Aug 2009

**Assistant Professor**, University of Toronto Institute for Aerospace Studies, Toronto, ON, Canada, Nov 2002–Jun 2008

**Teaching Assistant**, Stanford University, Jan–Apr 2001

**CAD Specialist**, Serviços de Engenharia S.A., Macau, China, Jun–Sep 1993

**Assistant Engineer**, Union Bay Shipbuilding Corporation, Seattle, WA, Jun–Sep 1992

## 4 Academic Awards and Distinctions

- Keynote lecture, *Congress on Numerical Methods in Engineering*, Lisbon, Portugal, Jun 2015.
- Best Paper Award, *15th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Sep 2014.

- Plenary speaker at the SIAM Conference on Optimization, San Diego, May 2014.
- Best Paper Award, *14th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Sep 2012.
- Keynote address at the Aircraft Structural Design Conference, Royal Aeronautical Society, London, UK, Oct 2010.
- Plenary speaker at the *International Forum on Aeroelasticity and Structural Dynamics*, Stockholm, Jun 2007.
- Best Paper Award, *11th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Sep 2006.
- Canada Research Chair in Multidisciplinary Design Optimization (Tier II), 2003–2009.
- Ballhaus Prize for Best Thesis in the Department of Aeronautics, Stanford University, Jun 2003.
- Best Paper Award, *9th AIAA/ISSMO Symposium on Multidisciplinary Analysis and Optimization*, Sep 2002.
- Praxis XXI Scholarship, Sep 1997.
- US–Norway Fulbright Foundation Stipend, Sep 1996.
- British Aerospace Award, May 1995.

## 5 Technical Committees

- Co-organizer of the NSF Workshop: “The Future of Multidisciplinary Design Optimization: Advancing the Design of Complex Systems”, Fort Worth, TX, Sep 2010.
- Technical Co-Chair for the *12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Victoria, BC, Sep 2008.
- Co-organizer of the *UTIAS–MITACS International Workshop on Aviation and Climate Change*, Toronto, May 2008, May 2010, and May 2012
- Co-organizer of the *Fields Industrial Optimization Seminars*, 2008–2009.
- AIAA Multidisciplinary Design Optimization TC, 2006–present.
- Canadian Aeronautics and Space Institute Aircraft Design and Development TC, 2005–2009.

## 6 Editorial Boards and Reviewing Activities

- Review editor for *Structural and Multidisciplinary Optimization* (2014–present)
- Associate editor for *Optimization and Engineering*, 2008–present.
- Associate editor for the *AIAA Journal* (2011–2015).
- Member of the Portuguese Foundation for Science and Technology review panel for Mechanical Engineering, Mar 2008.
- Member of the National Science Foundation review panel, August 2007, and Dec 2010.
- Guest editor for a special issue of *Optimization and Engineering*, 2007.
- Associate editor for the *Canadian Aeronautics and Space Journal*, 2006–2008.

- Delegate in the Partnership Group for Science and Engineering (PAGSE) Symposium, Ottawa, Mar 2006.
- Reviewer for the Netherlands Organization for Scientific Research
- Reviewer in three NSF review panels.
- Regular reviewer for the *AIAA Journal*, *Journal of Aircraft*, *Optimization and Engineering*, and *Structural and Multidisciplinary Optimization*. Reviewed manuscripts for the following journals: *ACM Transactions on Mathematical Software*, *Automatica*, *Aerospace Science and Technology*, *Canadian Aeronautics and Space Journal*, *Computers and Geosciences*, *International Journal of Computational Fluid Dynamics*, *Journal of Mechanical Design*, *Journal of Fluids and Structures*, *Journal of Spacecraft and Rockets*, and *SIAM Journal of Scientific Computing*.
- Regular session chair at the *AIAA Multidisciplinary Analysis and Optimization Conference*, the *World Congress on Structural and Multidisciplinary Optimization*, and the *AIAA Multidisciplinary Design Optimization Specialist Conference*. Also served as a session chair at the *International Council of the Aeronautical Sciences Congress* and the *International Forum on Aeroelasticity and Structural Dynamics*.

## 7 Publications

### 7.1 Refereed Journal Publications

- [J58] G. K. W. Kenway and J. R. R. A. Martins. Multipoint Aerodynamic Shape Optimization Investigations of the Common Research Model Wing. *AIAA Journal*, 54(1):113–128, January 2016. doi:10.2514/1.J054154.
- [J57] S. Chen, Z. Lyu, G. K. W. Kenway, and J. R. R. A. Martins. Aerodynamic Shape Optimization of the Common Research Model Wing-Body-Tail Configuration. *Journal of Aircraft*, 53(1):276–293, January 2016. doi:10.2514/1.C033328.
- [J56] A. B. Lambe and J. R. R. A. Martins. Structural and Aerostructural Design of Aircraft Wings using a Matrix-Free Optimizer. *Structural and Multidisciplinary Optimization*, 53(3):589–603, March 2016. doi:10.1007/s00158-015-1349-2.
- [J55] S. Arreckx, A. Lambe, J. R. R. A. Martins, and D. Orban. A Matrix-Free Augmented Lagrangian Algorithm with Application to Large-Scale Structural Design Optimization. *Optimization and Engineering*, 2016. doi:10.1007/s11081-015-9287-9, (In press).
- [J54] T. Ashuri, J. R. Martins, M. B. Zaaijer, G. A. van Kuik, and G. J. van Bussel. Aeroservoelastic Design Definition of a 20 MW Common Research Wind Turbine Model. *Wind Energy*, 2016. doi:10.1002/we.1970.
- [J53] Z. Lyu, G. K. Kenway, and J. R. R. A. Martins. Aerodynamic Shape Optimization Investigations of the Common Research Model Wing Benchmark. *AIAA Journal*, 53(4):968–985, April 2015. doi:10.2514/1.J053318.
- [J52] N. Garg, G. K. W. Kenway, Z. Lyu, J. R. R. A. Martins, and Y. L. Young. High-fidelity Hydrodynamic Shape Optimization of a 3-D Hydrofoil. *Journal of Ship Research*, 59(4):209–226, December 2015. doi:10.5957/JOSR.59.4.150046.
- [J51] R. Liem, G. K. W. Kenway, and J. R. R. A. Martins. Multimission Aircraft Fuel Burn Minimization via Multipoint Aerostructural Optimization. *AIAA Journal*, 53(1):104–122, January 2015. doi:10.2514/1.J052940.

- [J50] R. P. Liem, C. A. Mader, and J. R. R. A. Martins. Surrogate Models and Mixtures of Experts in Aerodynamic Performance Prediction for Aircraft Mission Analysis. *Aerospace Science and Technology*, 43:126–151, June 2015. doi:10.1016/j.ast.2015.02.019.
- [J49] Z. Lyu and J. R. R. A. Martins. Aerodynamic Shape Optimization of an Adaptive Morphing Trailing Edge Wing. *Journal of Aircraft*, 52(6):1951–1970, November 2015. doi:10.2514/1.C033116.
- [J48] K. A. James, G. J. Kennedy, and J. R. R. A. Martins. Concurrent Aerostructural Topology Optimization of a Wing Box. *Computers and Structures*, 134:1–17, April 2014. doi:10.1016/j.compstruc.2013.12.007.
- [J47] W. Du, N. Xue, W. Shyy, and J. R. Martins. A Surrogate-Based Multi-Scale Model for Mass Transport and Electrochemical Kinetics in Lithium-Ion Battery Electrodes. *Journal of the Electrochemical Society*, 161(8):E3086–E3096, April 2014. doi:10.1149/2.013408jes.
- [J46] T. Ashuri, M. B. Zaaijer, J. R. R. A. Martins, G. J. W. van Bussel, and G. A. M. van Kuik. Multidisciplinary Design Optimization of Offshore Wind Turbines for Minimum Levelized Cost of Energy. *Renewable Energy*, 68:893–905, August 2014. doi:10.1016/j.renene.2014.02.045.
- [J45] G. J. Kennedy and J. R. R. A. Martins. A parallel aerostructural optimization framework for aircraft design studies. *Structural and Multidisciplinary Optimization*, 50(6):1079–1101, December 2014. doi:10.1007/s00158-014-1108-9.
- [J44] N. Xue, W. Du, T. A. Greszler, W. Shyy, and J. R. R. A. Martins. Design of a Lithium-ion Battery Pack for PHEV Using Multiple Optimization Methods. *Applied Energy*, 115:591–602, February 2014. doi:10.1016/j.apenergy.2013.10.044.
- [J43] G. K. W. Kenway and J. R. R. A. Martins. Multipoint High-Fidelity Aerostructural Optimization of a Transport Aircraft Configuration. *Journal of Aircraft*, 51(1):144–160, January 2014. doi:10.2514/1.C032150.
- [J42] G. K. W. Kenway, G. J. Kennedy, and J. R. R. A. Martins. Scalable Parallel Approach for High-Fidelity Steady-State Aeroelastic Analysis and Derivative Computations. *AIAA Journal*, 52(5):935–951, May 2014. doi:10.2514/1.J052255.
- [J41] C. A. Mader and J. R. R. A. Martins. Computing Stability Derivatives and their Gradients for Aerodynamic Shape Optimization. *AIAA Journal*, 52(11):2533–2546, November 2014. doi:10.2514/1.J052922.
- [J40] A. Gogulapati, P. P. Friedmann, and J. R. R. A. Martins. Optimization of the Kinematics of a Flapping Wing MAV in Hover for Enhanced Performance. *AIAA Journal*, 52(10):2342–2354, October 2014. doi:10.2514/1.J053083.
- [J39] J. T. Hwang, D. Y. Lee, J. W. Cutler, and J. R. R. A. Martins. Large-Scale Multidisciplinary Optimization of a Small Satellite’s Design and Operation. *Journal of Spacecraft and Rockets*, 51(5):1648–1663, September 2014. doi:10.2514/1.A32751.
- [J38] G. J. Kennedy and J. R. R. A. Martins. A Parallel Finite-Element Framework for Large-Scale Gradient-Based Design Optimization of High-Performance Structures. *Finite Elements in Analysis and Design*, 87:56–73, September 2014. doi:10.1016/j.finel.2014.04.011.
- [J37] Z. Lyu and J. R. R. A. Martins. Aerodynamic Design Optimization Studies of a Blended-Wing-Body Aircraft. *Journal of Aircraft*, 51(5):1604–1617, September 2014. doi:10.2514/1.C032491.
- [J36] G. J. Kennedy and J. R. R. A. Martins. A Laminate Parametrization Technique for Discrete Ply Angle Problems with Manufacturing Constraints. *Structural and Multidisciplinary*

- Optimization*, 48(2):379–393, August 2013. doi:10.1007/s00158-013-0906-9.
- [J35] W. Du, N. Xue, A. Gupta, A. M. Sastry, J. R. R. A. Martins, and W. Shyy. Optimization of LiMn<sub>2</sub>O<sub>4</sub> Electrode Properties in a Gradient- and Surrogate-Based Framework. *Acta Mechanica Sinica*, 29(3):335–347, June 2013. doi:10.1007\_s10409-013-0039-x.
- [J34] W. Du, N. Xue, A. M. Sastry, J. R. R. A. Martins, and W. Shyy. Energy Density Comparison of Li-ion Cathode Materials using Dimensional Analysis. *Journal of The Electrochemical Society*, 160(8):A1187–A1193, May 2013. doi:10.1149/2.069308jes.
- [J33] N. Xue, W. Du, A. Gupta, W. Shyy, A. M. Sastry, and J. R. R. A. Martins. Optimization of a Single Lithium-ion Battery Cell with a Gradient-based Algorithm. *Journal of the Electrochemical Society*, 160(8):A1071–A1078, May 2013. doi:10.1149/2.036308jes.
- [J32] J. R. R. A. Martins and J. T. Hwang. Review and Unification of Methods for Computing Derivatives of Multidisciplinary Computational Models. *AIAA Journal*, 51(11):2582–2599, November 2013. doi:10.2514/1.J052184.
- [J31] M. Nelson, D. Temple, J. T. Hwang, Y. L. Young, J. R. R. A. Martins, and M. Collette. Simultaneous Optimization of Propeller-Hull Systems to Minimize Lifetime Fuel Consumption. *Applied Ocean Research*, 43:46–52, October 2013. doi:10.1016/j.apor.2013.07.004.
- [J30] J. R. R. A. Martins and A. B. Lambe. Multidisciplinary Design Optimization: A Survey of Architectures. *AIAA Journal*, 51(9):2049–2075, September 2013. doi:10.2514/1.J051895.
- [J29] C. A. Mader and J. R. R. A. Martins. Stability-Constrained Aerodynamic Shape Optimization of Flying Wings. *Journal of Aircraft*, 50(5):1431–1449, September 2013. doi:10.2514/1.C031956.
- [J28] A. B. Lambe and J. R. R. A. Martins. Extensions to the Design Structure Matrix for the Description of Multidisciplinary Design, Analysis, and Optimization Processes. *Structural and Multidisciplinary Optimization*, 46:273–284, August 2012. doi:10.1007/s00158-012-0763-y.
- [J27] E. Lee and J. R. R. A. Martins. Structural Topology Optimization with Design-Dependent Pressure Loads. *Computer Methods in Applied Mechanics and Engineering*, 233–236:40–48, August 2012. doi:10.1016/j.cma.2012.04.007.
- [J26] C. A. Mader and J. R. R. A. Martins. Derivatives for Time-Spectral Computational Fluid Dynamics Using an Automatic Differentiation Adjoint. *AIAA Journal*, 50(12):2809–2819, December 2012. doi:10.2514/1.J051658.
- [J25] G. J. Kennedy and J. R. R. A. Martins. A homogenization-based theory for anisotropic beams with accurate through-section stress and strain prediction. *International Journal of Solids and Structures*, 49(1):54–72, Jan. 2012. doi:10.1016/j.ijsolstr.2011.09.012.
- [J24] K. A. James and J. R. R. A. Martins. An Isoparametric Approach to Level Set Topology Optimization Using a Body-Fitted Finite Element Mesh. *Computers and Structures*, 90–91:97–106, January 2012. doi:10.1016/j.compstruc.2011.10.004.
- [J23] R. E. Perez, P. W. Jansen, and J. R. R. A. Martins. pyOpt: A Python-Based Object-Oriented Framework for Nonlinear Constrained Optimization. *Structural and Multidisciplinary Optimization*, 45(1):101–118, January 2012. doi:10.1007/s00158-011-0666-3.
- [J22] R. P. Henderson, J. R. R. A. Martins, and R. E. Perez. Aircraft Conceptual Design for Optimal Environmental Performance. *The Aeronautical Journal*, 116(1175):1–22, Jan. 2012.
- [J21] S. Haghghat, J. R. R. A. Martins, and H. H. T. Liu. Aeroservoelastic Design Optimization of a Flexible Wing. *Journal of Aircraft*, 49(2):432–443, March 2012. doi:10.2514/1.C031344.
- [J20] S. Haghghat, H. H. T. Liu, and J. R. R. A. Martins. A Model-Predictive Gust Load Alleviation Controller for a Highly Flexible Aircraft. *Journal of Guidance, Control and Dynamics*,

- 35(6):1751–1766, November 2012. doi:10.2514/1.57013.
- [J19] E. Lee, K. A. James, and J. R. R. A. Martins. Stress-Constrained Topology Optimization with Design-Dependent Loading. *Structural and Multidisciplinary Optimization*, 46:647–661, November 2012. doi:10.1007/s00158-012-0780-x.
- [J18] K. A. James, E. Lee, and J. R. R. A. Martins. Stress-Based Topology Optimization Using an Isoparametric Level Set Method. *Finite Elements in Analysis and Design*, 58:20–30, October 2012. doi:10.1016/j.finel.2012.03.012.
- [J17] C. A. Mader and J. R. R. A. Martins. Computation of Aircraft Stability Derivatives Using an Automatic Differentiation Adjoint Approach. *AIAA Journal*, 49(12):2737–2750, December 2011. doi:10.2514/1.J051147.
- [J16] Q. Thomson and J. R. R. A. Martins. Adaptive Accuracy Trust Region: Using Cross-Validation in the Optimization Process. *Engineering Optimization*, 43(6):615–633, June 2011. doi:10.1080/0305215X.2010.508521.
- [J15] T. W. Simpson and J. R. R. A. Martins. Multidisciplinary Design Optimization for Complex Engineered Systems Design: Report from an NSF Workshop. *Journal of Mechanical Design*, 133(10):101002, Oct. 2011. doi:10.1115/1.4004465.
- [J14] G. J. Kennedy, J. S. Hansen, and J. R. R. A. Martins. A Timoshenko beam theory with pressure corrections for layered orthotropic beams. *International Journal of Solids and Structures*, 48(16-17):2373–2382, 2011. doi:10.1016/j.ijsolstr.2011.04.009.
- [J13] N. P. Tedford and J. R. R. A. Martins. Benchmarking Multidisciplinary Design Optimization Algorithms. *Optimization and Engineering*, 11(1):159–183, Feb. 2010. doi:10.1007/s11081-009-9082-6.
- [J12] P. Jansen, R. E. Perez, and J. R. R. A. Martins. Aerostructural Optimization of Nonplanar Lifting Surfaces. *Journal of Aircraft*, 47(5):1491–1503, September 2010. doi:10.2514/1.44727.
- [J11] J. R. R. A. Martins, C. Marriage, and N. P. Tedford. pyMDO: An Object-Oriented Framework for Multidisciplinary Design Optimization. *ACM Transactions on Mathematical Software*, 36(4):20:1–20:25, Aug. 2009. doi:10.1145/1555386.1555389.
- [J10] K. James, J. S. Hansen, and J. R. R. A. Martins. Structural Topology Optimization for Multiple Load Cases Using a Dynamic Aggregation Technique. *Engineering Optimization*, 41(12):1103–1118, Dec. 2009. doi:10.1080/03052150902926827.
- [J9] I. R. Chittick and J. R. R. A. Martins. An Asymmetric Suboptimization Approach to Aerostructural Optimization. *Optimization and Engineering*, 10(1):133–152, Mar. 2009. doi:10.1007/s11081-008-9046-2.
- [J8] C. A. Mader, J. R. R. A. Martins, J. J. Alonso, and E. van der Weide. ADjoint: An Approach for the Rapid Development of Discrete Adjoint Solvers. *AIAA Journal*, 46(4):863–873, Apr. 2008. doi:10.2514/1.29123.
- [J7] I. R. Chittick and J. R. R. A. Martins. Aero-Structural Optimization Using Adjoint Coupled Post-Optimality Sensitivities. *Structural and Multidisciplinary Optimization*, 36(1):59–77, July 2008. doi:10.1007/s00158-007-0200-9.
- [J6] N. M. K. Poon and J. R. R. A. Martins. An Adaptive Approach to Constraint Aggregation Using Adjoint Sensitivity Analysis. *Structural and Multidisciplinary Optimization*, 34(1):61–73, July 2007. doi:10.1007/s00158-006-0061-7.
- [J5] A. C. Marta, C. A. Mader, J. R. R. A. Martins, E. van der Weide, and J. J. Alonso. A methodology for the development of discrete adjoint solvers using automatic differentiation tools. *International Journal of Computational Fluid Dynamics*, 21(9):307–327, 2007.

doi:10.1080/10618560701678647.

- [J4] P. Thokala and J. R. R. A. Martins. Variable-complexity optimization applied to airfoil design. *Engineering Optimization*, 39(3):271–286, Apr. 2006. doi:10.1080/03052150601107976.
- [J3] J. R. R. A. Martins, J. J. Alonso, and J. J. Reuther. A Coupled-Adjoint Sensitivity Analysis Method for High-Fidelity Aero-Structural Design. *Optimization and Engineering*, 6(1):33–62, Mar. 2005. doi:10.1023/B:OPTE.0000048536.47956.62.
- [J2] J. R. R. A. Martins, J. J. Alonso, and J. J. Reuther. High-Fidelity Aerostructural Design Optimization of a Supersonic Business Jet. *Journal of Aircraft*, 41(3):523–530, May 2004. doi:10.2514/1.11478.
- [J1] J. R. R. A. Martins, P. Sturdza, and J. J. Alonso. The Complex-Step Derivative Approximation. *ACM Transactions on Mathematical Software*, 29(3):245–262, September 2003. doi:10.1145/838250.838251.

## 7.2 Book Chapters

- [B3] J. R. R. A. Martins. *Green Aviation*, chapter Fuel burn reduction through wing morphing. Wiley, 2016. (In press).
- [B2] J. R. R. A. Martins. *Advances and Trends in Optimization with Engineering Applications*, chapter Multidisciplinary Design Optimization of Aerospace Systems. SIAM, 2016. (In press).
- [B1] N. Xue, W. Du, J. R. R. A. Martins, and W. Shyy. *Handbook of Clean Energy Systems*, volume 5 : Energy Storage, chapter 26: Lithium-Ion Batteries: Thermo-Mechanics, Performance, and Design Optimization, pages 2849–2864. John Wiley & Sons, Ltd, 2015.

## 7.3 Papers in Conference Proceedings

- [C104] N. Garg, G. K. W. Kenway, J. R. R. A. Martins, and Y. L. Young. High-fidelity Coupled Hydrostructural Optimization of a 3-D Hydrofoil. *International Symposium on Transport Phenomena and Dynamics of Rotating Machinery*, April 2016.
- [C103] T. R. Brooks, G. J. Kennedy, and J. R. R. A. Martins. High-fidelity Aerostructural Optimization of a High Aspect Ratio Tow-steered Wing. In *57th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*. American Institute of Aeronautics and Astronautics, January 2016.
- [C102] J. T. Hwang and J. R. R. A. Martins. Allocation-mission-design optimization of next-generation aircraft using a parallel computational framework. In *57th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*. American Institute of Aeronautics and Astronautics, January 2016.
- [C101] D. A. Burdette, G. K. Kenway, and J. R. R. A. Martins. Performance Evaluation of a Morphing Trailing Edge Using Multipoint Aerostructural Design Optimization. In *57th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*. American Institute of Aeronautics and Astronautics, January 2016.
- [C100] G. K. Kenway and J. R. R. A. Martins. Aerodynamic Shape Optimization of the CRM Configuration Including Buffet-Onset Conditions. In *54th AIAA Aerospace Sciences Meeting*, San Diego, CA, January 2016. American Institute of Aeronautics and Astronautics.
- [C99] J. S. Gray, J. Chin, T. Hearn, E. S. Hendricks, T. M. Lavelle, and J. R. R. A. Martins. Thermodynamics For Gas Turbine Cycles With Analytic Derivatives in OpenMDAO. In



- 57th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*. American Institute of Aeronautics and Astronautics, January 2016.
- [C98] J. Y. Kao, J. T. Hwang, J. R. R. A. Martins, J. S. Gray, and K. T. Moore. A Modular Adjoint Approach to Aircraft Mission Analysis and Optimization. In *Proceedings of the AIAA Science and Technology Forum and Exposition (SciTech)*, Kissimmee, FL, January 2015. AIAA 2015-0136.
- [C97] A. Dener, J. E. Hicken, G. K. W. Kenway, Z. Lyu, and J. R. R. A. Martins. Comparison of Newton–Krylov and Quasi-Newton Algorithms for Aerodynamic Shape Optimization. In *Proceedings of the AIAA Science and Technology Forum and Exposition (SciTech)*, Kissimmee, FL, January 2015. AIAA 2015-1129.
- [C96] D. Burdette, G. K. W. Kenway, Z. Lyu, and J. R. R. A. Martins. Aerostructural Design Optimization of an Adaptive Morphing Trailing Edge Wing. In *Proceedings of the AIAA Science and Technology Forum and Exposition (SciTech)*, Kissimmee, FL, January 2015. AIAA 2015-1129.
- [C95] J. T. Hwang, S. Roy, J. Y. Kao, J. R. R. A. Martins, and W. A. Crossley. Simultaneous aircraft allocation and mission optimization using a modular adjoint approach. In *Proceedings of the 56th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference*, Kissimmee, FL, Jan. 2015. AIAA 2015-0900.
- [C94] G. K. W. Kenway and J. R. R. A. Martins. Multipoint Aerodynamic Shape Optimization Investigations of the Common Research Model Wing. In *Proceedings of the AIAA Science and Technology Forum and Exposition (SciTech)*, Kissimmee, FL, January 2015.
- [C93] S. Chen, Z. Lyu, G. K. W. Kenway, and J. R. R. A. Martins. Aerodynamic Shape Optimization of the Common Research Model Wing-Body-Tail Configuration. In *Proceedings of the AIAA Science and Technology Forum and Exposition (SciTech)*, Kissimmee, FL, January 2015. AIAA 2015-1718.
- [C92] G. W. K. Kenway and J. R. R. A. Martins. High-fidelity aerostructural optimization considering buffet onset. In *Proceedings of the 16th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Dallas, TX, June 2015. AIAA 2015-2790.
- [C91] J. T. Hwang and J. R. R. A. Martins. Parallel allocation-mission optimization of a 128-route network. In *Proceedings of the 16th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Dallas, TX, June 2015.
- [C90] D. Ivaldi, N. R. Secco, S. Chen, J. T. Hwang, and J. R. R. A. Martins. Aerodynamic Shape Optimization of a Truss-Braced-Wing Aircraft. In *Proceedings of the 16th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Dallas, TX, June 2015. AIAA 2015-3436.
- [C89] N. Garg, Z. Lyu, T. Dhert, J. R. R. A. Martins, and Y. L. Young. High-fidelity Hydrodynamic Shape Optimization of a 3-D Morphing Hydrofoil. *Fourth International Symposium on Marine Propulsors*, June 2015.
- [C88] Z. Lyu, G. K. W. Kenway, and J. R. R. A. Martins. RANS-based Aerodynamic Shape Optimization Investigations of the Common Research Model Wing. In *Proceedings of the AIAA Science and Technology Forum and Exposition (SciTech)*, National Harbor, MD, January 2014. AIAA 2014-0567.
- [C87] G. J. Kennedy, G. K. W. Kenway, and J. R. R. A. Martins. High Aspect Ratio Wing Design: Optimal Aerostructural Tradeoffs for the Next Generation of Materials. In *Proceedings of the AIAA Science and Technology Forum and Exposition (SciTech)*, National Harbor, MD, January 2014. AIAA-2014-0596.

- [C86] Z. Lyu, Z. Xu, and J. R. R. A. Martins. Benchmarking Optimization Algorithms for Wing Aerodynamic Design Optimization. In *Proceedings of the 8th International Conference on Computational Fluid Dynamics*, Chengdu, Sichuan, China, July 2014. ICCFD8-2014-0203.
- [C85] J. T. Hwang, G. K. W. Kenway, and J. R. R. A. Martins. Geometry and Structural Modeling for High-Fidelity Aircraft Conceptual Design Optimization. In *Proceedings of the 15th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Atlanta, GA, June 2014. AIAA 2014-2041.
- [C84] G. J. Kennedy, G. K. W. Kenway, and J. R. R. A. Martins. Towards Gradient-Based Design Optimization of Flexible Transport Aircraft with Flutter Constraints. In *Proceedings of the 15th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Atlanta, GA, June 2014. AIAA 2014-2726.
- [C83] Z. Lyu and J. R. R. A. Martins. Strategies for Solving High-Fidelity Aerodynamic Shape Optimization Problems. In *15th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Atlanta, GA, June 2014. AIAA 2014-2594.
- [C82] R. P. Liem and J. R. R. A. Martins. Surrogate Models and Mixtures of Experts in Aerodynamic Performance Prediction for Mission Analysis. In *15th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Atlanta, GA, June 2014. AIAA-2014-2301.
- [C81] J. Gray, T. Hearn, K. Moore, J. T. Hwang, J. R. R. A. Martins, and A. Ning. Automatic Evaluation of Multidisciplinary Derivatives Using a Graph-Based Problem Formulation in OpenMDAO. In *Proceedings of the 15th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Atlanta, GA, June 2014.
- [C80] Z. Lyu and J. R. R. A. Martins. Aerodynamic Shape Optimization of an Adaptive Morphing Trailing Edge Wing. In *Proceedings of the 15th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Atlanta, GA, June 2014. AIAA 2014-3275.
- [C79] A. B. Lambe, G. J. Kennedy, and J. R. R. A. Martins. Multidisciplinary Design Optimization of an Aircraft Wing via a Matrix-Free Approach. In *Proceedings of the 15th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Atlanta, GA, June 2014. AIAA 2014-2429.
- [C78] G. K. W. Kenway, G. J. Kennedy, and J. R. R. A. Martins. Aerostructural Optimization of the Common Research Model Configuration. In *15th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Atlanta, GA, June 2014. AIAA 2014-3274.
- [C77] A. Gogulapati, P. P. Friedmann, and J. R. R. A. Martins. Optimization of the Kinematics of a Flapping Wing MAV in Hover for Enhanced Performance. In *Proceedings of the 54th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Boston, MA, April 2013.
- [C76] J. T. Hwang, D. Y. Lee, J. W. Cutler, and J. R. R. A. Martins. Large-Scale MDO of a Small Satellite using a Novel Framework for the Solution of Coupled Systems and their Derivatives. In *Proceedings of the 54th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Boston, MA, April 2013. **(Best Student Paper finalist)**.
- [C75] G. J. Kennedy and J. R. R. A. Martins. An Adjoint-based Derivative Evaluation Method for Time-dependent Aeroelastic Optimization of Flexible Aircraft. In *Proceedings of the 54th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Boston, MA, April 2013. AIAA 2013-1530.
- [C74] Z. Lyu and J. R. R. A. Martins. Aerodynamic Shape Optimization of a Blended-Wing-Body Aircraft. In *Proceedings of the 51st AIAA Aerospace Sciences Meeting*, Grapevine, TX, Jan.

2013. AIAA 2013-0283.
- [C73] Z. Lyu and J. R. R. A. Martins. RANS-based Aerodynamic Shape Optimization of a Blended-Wing-Body Aircraft. In *21st AIAA Computational Fluid Dynamics Conference*, San Diego, CA, Jul 2013.
- [C72] Z. Lyu, G. K. Kenway, C. Paige, and J. R. R. A. Martins. Automatic Differentiation Adjoint of the Reynolds-Averaged Navier–Stokes Equations with a Turbulence Model. In *21st AIAA Computational Fluid Dynamics Conference*, San Diego, CA, Jul. 2013.
- [C71] G. J. Kennedy and J. R. Martins. Hybrid-parallel Methods for Large-scale Gradient-based Structural Design Optimization. In *Proceedings of the 10th World Congress on Structural and Multidisciplinary Optimization*, Orlando, FL, May 2013.
- [C70] A. B. Lambe and J. R. R. A. Martins. A Matrix-Free Approach to Large-Scale Structural Optimization. In *Proceedings of the 10th World Congress on Structural and Multidisciplinary Optimization*, Orlando, FL, May 2013.
- [C69] R. P. Liem, C. A. Mader, E. Lee, and J. R. R. A. Martins. Aerostructural design optimization of a 100-passenger regional jet with surrogate-based mission analysis. In *2013 Aviation Technology, Integration, and Operations Conference*, Sep 2013.
- [C68] C. A. Mader and J. R. R. A. Martins. Optimal Flying Wings: A Numerical Optimization Study. In *53rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Honolulu, HI, Apr. 2012. AIAA 2012-1758.
- [C67] G. K. W. Kenway, G. J. Kennedy, and J. R. R. A. Martins. A Scalable Parallel Approach for High-Fidelity Aerostructural Analysis and Optimization. In *53rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Honolulu, HI, Apr. 2012. AIAA 2012-1922.
- [C66] J. R. R. A. Martins and J. T. Hwang. Review and Unification of Methods for Computing Derivatives of Multidisciplinary Systems. In *53rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Honolulu, HI, Apr. 2012. AIAA 2012-1589.
- [C65] G. J. Kennedy and J. R. R. A. Martins. A Regularized Discrete Laminate Parametrization Technique with Applications to Wing-Box Design Optimization. In *53rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Honolulu, HI, Apr. 2012. AIAA 2012-1519.
- [C64] J. T. Hwang and J. R. R. A. Martins. A Dynamic Parametrization Scheme for 3-D Shape Optimization Using Quasi-Newton Methods. In *Proceedings of the 50th AIAA Aerospace Sciences Meeting*, Nashville, TN, Jan. 2012. AIAA 2012-0962.
- [C63] J. T. Hwang, A. M. Waas, and J. R. R. A. Martins. Micromechanical Modeling and Design Optimization of 2-D Triaxial Braided Composites. In *Proceedings of the 50th AIAA Aerospace Sciences Meeting*, Nashville, TN, Jan. 2012. AIAA 2012-1257.
- [C62] G. J. Kennedy and J. R. R. A. Martins. A Comparison of Metallic and Composite Aircraft Wings Using Aerostructural Design Optimization. In *14th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Indianapolis, IN, Sep. 2012. AIAA-2012-5475.
- [C61] R. P. Liem, G. K. Kenway, and J. R. R. A. Martins. Multi-point, multi-mission, high-fidelity aerostructural optimization of a long-range aircraft configuration. In *Proceedings of the 14th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Indianapolis, IN, Sept. 2012. **(Best Paper Award)**.
- [C60] Z. Lu and J. R. R. A. Martins. Graph Partitioning-Based Coordination Methods

- for Large-Scale Multidisciplinary Design Optimization Problems. In *Proceedings of the 14th AIAA/ISSMO Multidisciplinary Analysis Optimization Conference*, Indianapolis, IN, September 2012. AIAA 2012-5522.
- [C59] J. T. Hwang and J. R. R. A. Martins. GeoMACH: Geometry-centric MDAO of Aircraft Configurations with High Fidelity. In *Proceedings of the 14th AIAA/ISSMO Multidisciplinary Analysis Optimization Conference*, Indianapolis, IN, Sept. 2012. (**Best Student Paper**).
- [C58] K. A. James, G. J. Kennedy, and J. R. R. A. Martins. Aerostructural Topology Optimization of an Aircraft Wingbox. In *Proceedings of the CASI AERO 2011 Conference*, Montreal, QC, Apr. 2011.
- [C57] G. J. Kennedy and J. R. R. A. Martins. Aerostructural design optimization of composite aircraft with stress and local buckling constraints using an implicit structural parametrization. In *Proceedings of CASI AERO 2011*, Montreal, Quebec, Apr. 2011.
- [C56] C. A. Mader and J. R. R. A. Martins. Stability-Constrained Aerodynamic Shape Optimization of Flying Wings. In *Proceedings of the CASI Conference*, Montreal, QC, Apr. 2011.
- [C55] S. Haghghat, H. H. T. Liu, and J. R. R. A. Martins. Mixed-Norm Multi-Objective Robust Controller Applied to a Very Flexible Aircraft. In *Proceedings of the AIAA Guidance, Navigation and Control Conference*, Portland, OR, Aug. 2011. AIAA 2011-6256.
- [C54] A. B. Lambe and J. R. R. A. Martins. A Unified Description of MDO Architectures. In *Proceedings of the 9th World Congress on Structural and Multidisciplinary Optimization*, Shizuoka, Japan, June 2011.
- [C53] K. A. James and J. R. R. A. Martins. Level Set Topology Optimization of Structures with Isoparametric Mesh Mapping. In *Proceedings of the 9th World Congress on Structural and Multidisciplinary Optimization*, Shizuoka, Japan, June 2011. Paper 257-1.
- [C52] S. Haghghat, H. H. T. Liu, and J. R. R. A. Martins. Aeroservoelastic Design Optimization of a High Aspect Ratio Flying Wing. In *Proceedings of the International Forum on Aeroelasticity and Structural Dynamics*, Paris, France, June 2011. IFASD-2011-162.
- [C51] K. A. James and J. R. R. A. Martins. Topology Optimization Using a Level Set Method with an Arbitrary Structured Mesh. In *6th AIAA Multidisciplinary Design Optimization Specialist Conference*, Orlando, FL, Apr. 2010. AIAA 2010-2842.
- [C50] G. K. Kenway, R. Henderson, J. E. Hicken, N. B. Kuntawala, D. W. Zingg, J. R. R. A. Martins, and R. G. McKeand. Reducing Aviation's Environmental Impact Through Large Aircraft For Short Ranges. In *Proceedings of the 48th AIAA Aerospace Sciences Meeting and Exhibit*, Orlando, FL, Jan. 2010. AIAA 2010-1015.
- [C49] G. K. Kenway, G. J. Kennedy, and J. R. R. A. Martins. A CAD-Free Approach to High-Fidelity Aerostructural Optimization. In *Proceedings of the 13th AIAA/ISSMO Multidisciplinary Analysis Optimization Conference*, Fort Worth, TX, Sept. 2010. AIAA 2010-9231.
- [C48] C. A. Mader and J. R. R. A. Martins. Stability-Constrained Aerodynamic Shape Optimization of a Flying Wing Configuration. In *Proceedings of the 13th AIAA/ISSMO Multidisciplinary Analysis Optimization Conference*, Fort Worth, TX, Sept. 2010. AIAA 2010-9199.
- [C47] G. J. Kennedy and J. R. R. A. Martins. Parallel Solution Methods for Aerostructural Analysis and Design Optimization. In *Proceedings of the 13th AIAA/ISSMO Multidisciplinary Analysis Optimization Conference*, Fort Worth, TX, Sept. 2010. AIAA 2010-9308.
- [C46] S. Haghghat, H. H. T. Liu, and J. R. R. A. Martins. Application of Robust Control Design

- Techniques to the Aeroservoelastic Design Optimization of a Very Flexible UAV Wing. In *Proceedings of the 13th AIAA/ISSMO Multidisciplinary Analysis Optimization Conference*, Fort Worth, TX, Sept. 2010. AIAA 2010-9123.
- [C45] A. B. Lambe and J. R. R. A. Martins. A New Approach to Multidisciplinary Design Optimization via Internal Decomposition. In *Proceedings of the 13th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Fort Worth, TX, Sept. 2010. AIAA 2010-9325.
- [C44] S. Haghghat, H. H. T. Liu, and J. R. R. A. Martins. Application of Model Predictive Control to Gust Loads Alleviation Systems. In *Proceedings of the AIAA Atmospheric Flight Mechanics Conference and Exhibit*, Chicago, IL, Aug. 2009. AIAA 2009-5929.
- [C43] S. Haghghat, J. R. R. A. Martins, and H. H. T. Liu. Integrating an Active Control System with the Structural Design of a Flexible Wing Using Multidisciplinary Optimization. In *Proceedings of the International Forum on Aeroelasticity and Structural Dynamics*, Seattle, USA, June 2009.
- [C42] C. A. Mader and J. R. R. A. Martins. A Discrete Adjoint Formulation for Stability Derivatives Using the ADjoint Approach. In *Proceedings of the CASI Conference*, Kanata, ON, May 2009.
- [C41] S. Haghghat, H. H. T. Liu, and J. R. R. A. Martins. Gust Load Alleviation Using Model Predictive Control for Large Aspect Ratio UAV Wings. In *Canadian Aeronautics and Space Institute Annual General Meeting*, Ottawa, Canada, May 2009.
- [C40] R. Henderson and J. R. R. A. Martins. Conceptual Design and Optimization of Environmentally-Friendly Aircraft. In *Proceedings of the 2009 SAE AeroTech Congress and Exhibition*. SAE, Nov. 2009.
- [C39] K. A. James, J. S. Hansen, and J. R. R. A. Martins. Structural Topology Optimization for Multiple Load Cases While Avoiding Local Minima. In *Proceedings of the 4th AIAA Multidisciplinary Design Optimization Specialist Conference*, Schaumburg, IL, Apr. 2008. AIAA 2008-2287.
- [C38] S. Haghghat, H. H. T. Liu, and J. R. R. A. Martins. Modeling and Simulation of Flexible UAVs with Large Aspect Ratio. In *Proceedings of the International Conference on System Simulation and Scientific Computing*, Beijing, China, Oct. 2008.
- [C37] C. A. Mader, G. K. W. Kenway, and J. R. R. A. Martins. A Framework for High-Fidelity Aerostructural Optimization of Aircraft Configurations. In *Proceedings of the International Conference on System Simulation and Scientific Computing*, Beijing, China, Oct. 2008.
- [C36] Q. Thomson and J. R. R. A. Martins. Progressive Validity Trust Region Optimization Using a Kriging Metamodel. In *Proceedings of the 12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Victoria, BC, Sept. 2008.
- [C35] G. Kennedy, J. R. R. A. Martins, and J. S. Hansen. Aerostructural Optimization of Aircraft Structures Using Asymmetric Subspace Optimization. In *Proceedings of the 12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Victoria, BC, Canada, Sept. 2008. AIAA 2008-5847.
- [C34] R. E. Perez, R. Henderson, and J. R. R. A. Martins. Multidisciplinary Design Optimization of Airframe and Engine for Emissions Reduction. In *Proceedings of the 12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Victoria, BC, Sept. 2008.
- [C33] C. J. Marriage and J. R. R. A. Martins. Reconfigurable Semi-Analytic Sensitivity Methods and MDO Architectures Within the  $\pi$ MDO Framework. In *12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Victoria, BC, 2008. AIAA 2008-5956.

- [C32] K. James and J. R. R. A. Martins. Three-Dimensional Structural Topology Optimization of an Aircraft Wing Using Level Set Methods. In *Proceedings of the 12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Victoria, BC, Sept. 2008.
- [C31] C. A. Mader, G. Kenway, and J. R. R. A. Martins. Towards High-Fidelity Aerostructural Optimization Using a Coupled ADjoint Approach. In *Proceedings of the 12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Victoria, BC, Sept. 2008. AIAA 2008-5968.
- [C30] G. K. W. Kenway and J. R. R. A. Martins. Aerostructural Shape Optimization of Wind Turbine Blades Considering Site-Specific Winds. In *Proceedings of the 12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Victoria, BC, Sept. 2008. AIAA 2008-6025.
- [C29] A. T. Yu and J. R. R. A. Martins. A Configurable B-Spline Parametrization Method for Structural Optimization of Wing Boxes. In *Proceedings of the 12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Victoria, BC, Sept. 2008.
- [C28] R. E. Perez and J. R. R. A. Martins. pyACDT: An Object-Oriented Framework for Aircraft Design Modelling and Multidisciplinary Optimization. In *Proceedings of the 12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Victoria, BC, Sept. 2008. AIAA 2008-5955.
- [C27] J. R. R. A. Martins and C. Marriage. An Object-Oriented Framework for Multidisciplinary Design Optimization. In *Proceedings of the 3rd AIAA Multidisciplinary Design Optimization Specialist Conference*, Waikiki, HI, Apr. 2007. AIAA 2007-1906.
- [C26] A. T. Yu and J. R. R. A. Martins. Structural Optimization of a Wing Box Using B-Spline Parametrization. In *Proceedings of the CASI Conference*, Toronto, ON, Apr. 2007.
- [C25] C. A. Mader, J. R. R. A. Martins, and A. C. Marta. Towards Aerodynamic Shape Optimization of an Oblique Wing Using the ADjoint Approach. In *Proceedings of the CASI Conference*, Toronto, ON, Apr. 2007.
- [C24] I. R. Chittick and J. R. R. A. Martins. A New Subspace Optimization Method for Aero-Structural Design. In *Proceedings of the 3rd AIAA Multidisciplinary Design Optimization Specialist Conference*, Waikiki, HI, Apr. 2007. AIAA 2007-1867.
- [C23] C. A. Mader, J. R. R. A. Martins, and A. C. Marta. Towards Aircraft Design Using an Automatic Discrete Adjoint Solver. In *Proceedings of the 18th AIAA Computational Fluid Dynamics Conference*, Miami, FL, June 2007. AIAA 2008-5968.
- [C22] C. A. Mader, A. C. Marta, and J. R. R. A. Martins. Aerodynamic Shape Optimization of an Oblique Wing Using the ADjoint Approach. In *Proceedings of the 15th Conference of the CFD Society of Canada*, Toronto, ON, May 2007.
- [C21] J. R. R. A. Martins and I. R. Chittick. Subspace Optimization of Multidisciplinary Systems Using Coupled Post-Optimality Sensitivity Analysis. In *Proceedings of the 7th World Congress on Structural and Multidisciplinary Optimization*, Seoul, South Korea, May 2007.
- [C20] N. P. Tedford and J. R. R. A. Martins. Comparison of MDO Architectures within a Universal Framework. In *Proceedings of the 2nd AIAA Multidisciplinary Design Optimization Specialist Conference*, Newport, RI, May 2006. AIAA 2006-1617.
- [C19] J. R. R. A. Martins, J. J. Alonso, and E. van der Weide. An Automated Approach for Developing Discrete Adjoint Solvers. In *Proceedings of the 2nd AIAA Multidisciplinary Design Optimization Specialist Conference*, Newport, RI, May 2006. AIAA 2006-1608.
- [C18] N. P. Tedford and J. R. R. A. Martins. On the Common Structure of MDO Problems: A

- Comparison of Architectures. In *Proceedings of the 11th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Portsmouth, VA, Sept. 2006. AIAA 2006-7080.
- [C17] J. R. R. A. Martins, C. A. Mader, and J. J. Alonso. ADjoint: An Approach for Rapid Development of Discrete Adjoint Solvers. In *Proceedings of the 11th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Portsmouth, VA, Sept. 2006. AIAA 2006-7121 (**Best Paper Award**).
- [C16] A. T. Yu and J. R. R. A. Martins. Efficient Coupled-Sensitivity Analysis Methods for Aero-Structural Optimization. In *Proceedings of the CASI Aircraft Design and Development Symposium*, Toronto, ON, Apr. 2005.
- [C15] N. M. K. Poon and J. R. R. A. Martins. Adaptive Constraint Aggregation for Structural Optimization Using Adjoint Sensitivities. In *Proceedings of the CASI Aircraft Design and Development Symposium*, Toronto, ON, Apr. 2005.
- [C14] P. Thokala and J. R. R. A. Martins. Variable Complexity Methods Applied to Airfoil Optimization. In *Proceedings of the CASI Aircraft Design and Development Symposium*, Toronto, ON, Apr. 2005.
- [C13] F. D. Harris. An Economic Model of U.S. Airline Operating Expenses. Technical Report CR-2005-213476, NASA Ames Research Center, Moffett Field, CA 94035, Dec 2005.
- [C12] J. R. R. A. Martins and N. M. K. Poon. On Structural Optimization Using Constraint Aggregation. In *Proceedings of the 6th World Congress on Structural and Multidisciplinary Optimization*, Rio de Janeiro, Brazil, May 2005.
- [C11] J. J. Alonso, P. LeGresley, E. van der Weide, J. R. R. A. Martins, and J. J. Reuther. pyMDO: A Framework for High-Fidelity Multi-Disciplinary Optimization. In *Proceedings of the 10th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Albany, NY, Sept. 2004. AIAA 2004-4480.
- [C10] J. R. R. A. Martins, J. J. Alonso, and J. J. Reuther. A Coupled-Adjoint Sensitivity Analysis Method for Aero-Structural Optimization. In *Proceedings of the CASI Aircraft Design and Development Symposium*, Montréal, QC, Apr. 2003.
- [C9] J. R. R. A. Martins, J. J. Alonso, and P. LeGresley. Aero-Structural Optimization of Aircraft Configurations Using Coupled-Sensitivity Analysis. In *Proceedings of the SIAM Conference on Computational Science and Engineering*, San Diego, CA, Feb. 2003.
- [C8] J. J. Alonso, J. R. R. A. Martins, J. J. Reuther, and R. Haimes. High-Fidelity Aero-Structural Design Using a Parametric CAD-Based Model. In *Proceedings of the 16th AIAA Computational Fluid Dynamics Conference*, Orlando, FL, June 2003. AIAA 2003-3429.
- [C7] J. R. R. A. Martins, J. J. Alonso, and J. J. Reuther. High-Fidelity Aero-Structural Design Optimization of a Supersonic Business Jet. In *Proceedings of the 43rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Denver, CO, Apr. 2002. AIAA 2002-1483.
- [C6] J. R. R. A. Martins, J. J. Alonso, and J. J. Reuther. Complete Configuration Aero-Structural Optimization Using a Coupled Sensitivity Analysis Method. In *Proceedings of the 9th AIAA/ISSMO Symposium on Multidisciplinary Analysis and Optimization*, Atlanta, GA, Sept. 2002. AIAA 2002-5402 (**Best Paper Award**).
- [C5] J. R. R. A. Martins, P. Sturdza, and J. J. Alonso. The Connection Between the Complex-Step Derivative Approximation and Algorithmic Differentiation. In *Proceedings of the 39th AIAA Aerospace Sciences Meeting*, Reno, NV, Jan. 2001. AIAA 2001-0921.
- [C4] P. Peterson, J. R. R. A. Martins, and J. J. Alonso. Fortran to Python Interface Generator

with an Application to Aerospace Engineering. In *Proceedings of the 9th International Python Conference*, Long Beach, CA, Jan. 2001.

- [C3] J. R. R. A. Martins, J. J. Alonso, and J. J. Reuther. Aero-Structural Wing Design Optimization Using High-Fidelity Sensitivity Analysis. In H. Höllinger, editor, *Proceedings of the CEAS Conference on Multidisciplinary Aircraft Design and Optimization*, pages 211–226, Köln, Germany, June 2001.
- [C2] J. R. R. A. Martins, I. M. Kroo, and J. J. Alonso. An Automated Method for Sensitivity Analysis Using Complex Variables. In *Proceedings of the 38th AIAA Aerospace Sciences Meeting*, Reno, NV, Jan. 2000. AIAA 2000-0689.
- [C1] J. Reuther, J. J. Alonso, J. R. R. A. Martins, and S. C. Smith. A Coupled Aero-Structural Optimization Method for Complete Aircraft Configurations. In *Proceedings of the 37th AIAA Aerospace Sciences Meeting and Exhibit*, Reno, NV, Jan. 1999. AIAA 99-0187.

## 7.4 Reports and Other Publications

- [R13] J. R. R. A. Martins. Wing Design via Numerical Optimization. *SIAG/OPT Views-and-News*, 23(2), October 2014.
- [R12] J. R. R. A. Martins and E. A. Kostina. Editorial—Special Issue on Optimization and Engineering Applications. *Optimization and Engineering*, 11(1):1–3, Feb. 2010. doi:10.1007/s11081-010-9105-3.
- [R11] G. J. Kennedy, G. K. Kenway, and J. R. R. A. Martins. A Comparison of Metallic, Composite and Nanocomposite Optimal Transonic Transport Wings. Technical report, NASA, March 2014. CR-2014-218185.
- [R10] T. Simpson and J. R. R. A. Martins. The Future of Multidisciplinary Design Optimization: Advancing the Design of Complex Engineered Systems. NSF workshop report, NSF, September 2010.
- [R9] G. K. W. Kenway and J. R. R. A. Martins. Aerodynamic Design of a 10 kW Vertical Axis Wind Turbine. Technical report, University of Toronto Institute for Aerospace Studies, January 2009.
- [R8] P. Jansen and J. R. R. A. Martins. Vale Experimental Towed Platform—Aerodynamic Shell Design. Technical report, Vale Exploration Canada, May 2008.
- [R7] J. R. R. A. Martins. A Review of a Wind Tunnel Test Report. Technical report, Ontario Human Rights Commission, August 2007.
- [R6] J. R. R. A. Martins. C-Class Airfoil Analysis, Part 2. Technical report, University of Toronto Institute for Aerospace Studies, March 2005.
- [R5] J. R. R. A. Martins. C-Class Airfoil Analysis, Part 1. Technical report, University of Toronto Institute for Aerospace Studies, February 2005.
- [R4] J. R. R. A. Martins. *A Coupled-Adjoint Method for High-Fidelity Aero-Structural Optimization*. PhD thesis, Stanford University, 2002.
- [R3] J. R. R. A. Martins. Drag Reduction of Staggered Supersonic Wings. Technical report, Stanford University, June 1997.
- [R2] J. R. R. A. Martins. Self-Similar Solutions for the Plane Turbulent Jet. TAE no. 750, Faculty of Aerospace Engineering, Technion – Israel Institute of Technology, Haifa, Israel, June 1995.
- [R1] J. R. R. A. Martins. Front Fuselage Structure of an Advanced Air Superiority Fighter. Technical report, Department of Aeronautics, Imperial College, London, UK, May 1994.



## 8 Invited Presentations

- [I87] *Multidisciplinary Design Optimization of Aircraft Configurations. Part 1: A modular coupled adjoint approach*, von Karman Institute Lecture Series, Brussels, Belgium, May 2016.
- [I86] *Multidisciplinary Design Optimization of Aircraft Configurations. Part 2: High-fidelity aerostuctural optimization*, von Karman Institute Lecture Series, Brussels, Belgium, May 2016.
- [I85] *Optimisation numérique de la conception d'une aile d'avion: Rêve ou réalité?*, ENSEEIHT, Toulouse, France, May 2016.
- [I84] *Optimisation numérique de la conception d'une aile d'avion: Rêve ou réalité?*, ONERA Fluid Mechanics and Energetics Branch, Paris, France, Mar 2016.
- [I83] *Multidisciplinary design optimization (MDO): Theory and applications*, Red Cedar Workshop, East Lansing, MI, Feb 2016
- [I82] *Multidisciplinary design optimization (MDO): A new scalable and modular approach*, ROMA Seminar, ISAE, Toulouse, France, Jan 2016.
- [I81] *A Very Short Course on Multidisciplinary Design Optimization*, ISAE, Toulouse, France, Mar 2016.
- [I80] *High-Fidelity Multidisciplinary Design Optimization*, Airbus Technical Workshop, Airbus, Filton, UK, Dec 2015.
- [I79] *Practical wing design via numerical optimization: Are we there yet?*, University of Bristol, UK, Dec 2015.
- [I78] *Optimisation numérique de la conception d'une aile d'avion: Rêve ou réalité?*, Institut Clément Ader, Toulouse, France, Nov 2015.
- [I77] *Wing design via numerical optimization: Are we there yet?*, ONERA AGILE Workshop, Toulouse, Dec 2015.
- [I76] *Optimisation numérique de la conception d'une aile d'avion: Rêve ou réalité?*, Dassault Aviation, Paris, France, Oct 2015.
- [I75] *Optimisation numérique de la conception d'une aile d'avion: Rêve ou réalité?*, École Polytechnique, Paliseau, France, Oct 2015.
- [I74] *Optimisation numérique de la conception d'une aile d'avion: Rêve ou réalité?*, Séminaire DAEP, ISAE, Toulouse, France, Oct 2015.
- [I73] *High-Fidelity Multidisciplinary Design Optimization for the Next-Generation of Commercial Transport Aircraft*, AMEDEO ESR Training Course, ONERA, Paris, France, Oct 2015.
- [I72] *High-Fidelity Multidisciplinary Design Optimization for the Next Generation of Aircraft*, Congress on Numerical Methods in Engineering, Lisbon, Portugal, Jul 2015.
- [I71] *Wing Design via Numerical Optimization—Are we there yet?*, Lehigh University, May 2015.
- [I70] *High-Fidelity Multidisciplinary Design Optimization*, Boeing, Huntington Beach, May 2015.
- [I69] *High-Fidelity Aerostructural Optimization for the Next Generation of Aircraft*, Altair Symposium, Ann Arbor, MI, Apr 2015.
- [I68] *Wing Design via Numerical Optimization—Are we there yet?*, Politecnico di Torino, Turin, Italy, Mar 2015.
- [I67] *Aerodynamic and Aerostructural Wing Design Optimization*, AIAA Aerodynamic Technical Working Group, Kissimmee, FL, Jan 2015.

- [I66] *Next-generation computational tools for airframe analysis and design*, Boeing, Huntington Beach, Dec 2014.
- [I65] *Wing Design via Numerical Optimization: Are we there yet?*, Bombardier Aerospace, Montreal, Canada, Oct 2014.
- [I64] *Wing Design via Numerical Optimization: Are we there yet?*, McGill University, Montreal, Canada, Oct 2014.
- [I63] *CFD-Based Aerodynamic Shape Optimization for Aircraft Design*, CFD Summer School, Tsinghua University, Beijing, China, Jul 2014.
- [I62] *Large-Scale Optimization of Multidisciplinary Engineering Systems*, SIAM Conference on Optimization, San Diego, May 2014.
- [I61] *High-Fidelity Multidisciplinary Design Optimization for Aerospace Systems*, ATA Engineering, Poway, CA, May 2014.
- [I60] *Wing Design via Numerical Optimization: Are We There Yet?*, Massachusetts Institute of Technology, Boston, MA, Apr 2014.
- [I59] *Multidisciplinary Design Optimization of Aircraft Configurations*, Massachusetts Institute of Technology, Invited lecture for 16.888/ESD.77 Multidisciplinary System Design Optimization, Department of Aeronautics and Astronautics, Apr 2014, Boston, MA.
- [I58] *High-Fidelity Wing Design Optimization*, Aurora Flight Sciences, Cambridge, MA, Apr 2014.
- [I57] *Design Optimization of the CADRE CubeSat using OpenMDAO*, NASA Glenn Research Center, OH, Apr 2014.
- [I56] *High-Fidelity Aerostructural Design Optimization of High Aspect Ratio Wings*, NASA Langley Research Center, VA, Apr 2014.
- [I55] *Design Optimization of the CADRE CubeSat using OpenMDAO*, NASA Glenn Research Center, OH, Apr 2014.
- [I54] *Aerodynamic Shape Optimization of a Morphing Wing*, NASA Langley Research Center, VA, Apr 2014.
- [I53] *Towards Optimal Aeroelastic Tailoring of Wind Turbine Blades*, NTNU, Trondheim, Norway, Oct 2013.
- [I52] *Optimal Aeroelastic Tailoring of Composite Wings*, Composites 2013, IV ECCOMAS Conference on the Mechanical Response of Composites, Ponta Delgada, Portugal, Sep 2013.
- [I51] *A Matrix-Free Approach to Large-Scale Nonlinear Constrained Optimization*, 4th International Conference on Continuous Optimization, Caparica, Portugal, Jul 2013.
- [I50] *Towards Practical High-Fidelity Aerostructural Optimization*, Research Consortium for Multidisciplinary System Design Workshop, Stanford University, Department of Aeronautics and Astronautics, Jul 2013.
- [I49] *High-Fidelity Multidisciplinary Design Optimization for the Next Generation of Aircraft*, Airbus, Toulouse, France, Jun 2013.
- [I48] *High-Fidelity Multidisciplinary Design Optimization for the Next Generation of Aircraft*, University of São Paulo, Brazil, Apr 2013.
- [I47] *High-Fidelity Aerostructural Design Optimization of Commercial Transport Aircraft*, Boeing Tech Splash (remote presentation), Apr 2013.

- [I46] *An Overview of MDO for Aircraft Configurations*, MSTC/AFOSR Multi-Fidelity Analysis for Aerospace Vehicle Design TIM Dayton, OH, Feb 2013
- [I45] *Towards Optimal Aeroelastic Tailoring of Wind Turbine Blades*, 2nd NREL Systems Engineering Workshop, Boulder, CO, Jan 2013
- [I44] *A Comparison of Metallic versus Composite Wings using Aerostructural Design Optimization*, Carbon Fiber Conference, La Jolla, CA, Dec 2012
- [I43] *An Overview of Tools and Methods for the MDO of Aircraft Configurations*, NASA Langley Research Center, Hampton, VA, Nov 2012
- [I42] *High-Fidelity Multidisciplinary Design Optimization for the Next Generation of Aircraft*, University of Illinois Urbana-Champaign, IL, Oct 2012
- [I41] *High-Fidelity Multidisciplinary Design Optimization of Aircraft Configurations*, University of Michigan AE585 Seminar, Sep 2012
- [I40] *Optimal Aeroelastic Tailoring of Aircraft Wings Using a Coupled Adjoint Method*, ANSYS Inc., Lebanon, NH, Aug 2012
- [I39] *High-Fidelity Multidisciplinary Design Optimization of Aircraft Configurations*, Lockheed Martin, Palmdale, CA, Aug 2012
- [I38] *High-Fidelity Optimal Aeroelastic Tailoring of Highly Flexible Wings. . . and some other stuff*, MDO Consortium Workshop, Purdue University, Jul 2012
- [I37] *High-Fidelity Optimal Aeroelastic Tailoring of Highly Flexible Wings*, Boeing Development Center, Tukwila, WA, Jul 2012
- [I36] *Geometry-Centric MDAO of Aircraft Configurations with High-Fidelity*, NASA Glenn Research Center, Cleveland, OH, Jul 2012
- [I35] *High-Fidelity Optimal Aeroelastic Tailoring of Highly Flexible Wings*, Embraer, São José dos Campos, Brazil, Jul 2012
- [I34] *A Short Course on Multidisciplinary Design Optimization*, Embraer, São José dos Campos, Brazil, Jul 2012 (3 day course)
- [I33] *High-Fidelity Optimal Aeroelastic Tailoring of Highly Flexible Wings*, FlexSys Inc, Ann Arbor, MI, Jul 2012
- [I32] *High-Fidelity Aerostructural Optimization Tools for Future Aircraft Design*, 3rd International Workshop on Aviation and Climate Change, University of Toronto, Canada, May 2012
- [I31] *Multidisciplinary Design Optimization: An Introduction for Applied Mathematicians*, École Polytechnique de Montréal, Nov 2011.
- [I30] *High-Fidelity Multidisciplinary Design Optimization for the Next Generation of Aircraft*, TU Delft, Netherlands, Oct 2011.
- [I29] *Multidisciplinary Design Optimization*, Forum and Symposium on Digital Fabrication (remote presentation), Lima, Peru, Aug 18, 2011.
- [I28] *Aircraft Design Optimization for Minimum Environmental Impact*, Upper Michigan Green A Coalition Conference, Escanaba, MI, Jun 2011.
- [I27] *Multidisciplinary Design Optimization: Theory and Applications*, tutorial for the Optimization Days conference, Montréal, Canada, May 2011.
- [I26] *High-Fidelity Multidisciplinary Design Optimization of Aircraft Configurations*, Bombardier Aerospace, Dorval, QC, Canada, March 2011.

- [I25] *High-Fidelity Multidisciplinary Design Optimization for the Next Generation of Aircraft*, *Aircraft Structural Design Conference*, Royal Aeronautical Society, London, UK, October 2010 (Keynote address).
- [I24] *Multidisciplinary Design Optimization of Aircraft Configurations*, Deutsches Zentrum für Luft- und Raumfahrt (DLR), Braunschweig, Germany, August 2010.
- [I23] *ADjoint: An Approach for the Rapid Development of Discrete Adjoint Solvers*, Deutsches Zentrum für Luft- und Raumfahrt (DLR), Braunschweig, Germany, August 2010.
- [I22] *High-Fidelity MDO for Aircraft Design*, Research Consortium for Multidisciplinary System Design Workshop, Massachusetts Institute of Technology, Department of Aeronautics and Astronautics, July, 2010.
- [I21] *A Short Course on Multidisciplinary Design Optimization*, Portuguese Air Force Academy, Sintra, Portugal, May 2010 (2 day short course).
- [I20] *Multidisciplinary Design Optimization of Aircraft Configurations*, NASA Glenn Research Center, March 2010.
- [I19] *Architectures for Multidisciplinary Design Optimization*, Research Consortium for Multidisciplinary System Design Workshop, Stanford University, Department of Aeronautics and Astronautics, June 2009.
- [I18] *Aerostructural Shape Optimization of Wind Turbine Blades Considering Site-Specific Winds*, The New Zealand Institute of Mathematics and its Applications, New Zealand, February 2009.
- [I17] *High-Fidelity MDO of Aircraft Configurations*, TU Delft, Netherlands, August 2008.
- [I16] *Adjoint Methods for High-Fidelity Aerostructural Design Optimization*, Imperial College, London, UK, August 2008.
- [I15] *MDO Approaches and Frameworks*, Research Consortium for Multidisciplinary System Design Workshop, Massachusetts Institute of Technology, Department of Aeronautics and Astronautics, July, 2008.
- [I14] *On Multidisciplinary Design Optimization: Theory and Algorithms*, Massachusetts Institute of Technology, Department of Aeronautics and Astronautics, April, 2008.
- [I13] *A Framework for Automatic Implementation of MDO Architectures*, 6th International Congress on Industrial and Applied Mathematics, Zürich, July 2007.
- [I12] *An Object-Oriented Framework for Multidisciplinary Design Optimization*, Sandia National Laboratories, Albuquerque, NM, July 2007.
- [I11] *Methods for High-Fidelity Multidisciplinary Design Optimization*, Research Consortium for Multidisciplinary System Design Workshop, Stanford University, CA, July 2007.
- [I10] *Multidisciplinary Methods for High-Fidelity Aero-Structural Optimization*, International Forum on Aeroelasticity and Structural Dynamics, Stockholm, June 2007 (Plenary session).
- [I9] *A Short Course on Multidisciplinary Optimization*, 5th Annual Conference of the CFD Society of Canada, Toronto, May 2007 (1 day course).
- [I8] *Multidisciplinary Optimization: Current Status and Future Directions*, Optimization in Engineering Workshop, Banff International Research Station, November 2006.
- [I7] *High-Fidelity MDO of Aircraft Configurations*, Airbus, Toulouse, December 2006.
- [I6] *High-Fidelity MDO of Aircraft Configurations*, Bombardier Aerospace, Montréal, March 2006.

- [15] *Aero-Structural Wing Design Using Coupled Sensitivity Analysis*, The Fields Institute, Toronto, December 2004.
- [14] *High-Fidelity Aero-Structural Design Optimization of Aircraft Configurations*, University of Minnesota, Aerospace Engineering and Mechanics Department, May 2004.
- [13] *High-Fidelity Aero-Structural Optimization of Aircraft Configurations*, Massachusetts Institute of Technology, Department of Aeronautics and Astronautics, April 2004.
- [12] *The Complex-Step Derivative Approximation*, Lawrence Livermore National Laboratory, Livermore, CA, August 2001.
- [11] *The Complex-Step Derivative Approximation*, Sandia National Laboratories, Albuquerque, NM, March 2001.

## 9 Teaching Experience

### 9.1 AER501: Advanced Mechanics of Structures

**Description:** This is a 4th year undergraduate course that is also open to graduate students. I completely redesigned this course when I started teaching it. It was part of a plan to modernize the 3rd and 4th year structural mechanics curriculum by introducing the finite-element method and structural optimization.

**Terms taught:** Winter 2003, Fall 2003, Fall 2004, Fall 2005, Fall 2006, Fall 2007, Fall 2008

### 9.2 AER406: Aircraft Design

**Description:** This is a senior year undergraduate class whose material is geared towards designing, building and flying electric UAVs. The final evaluation of the projects is based on presentations, a report, and a flight test. The course material consists on a review of aerodynamics, structures, propulsion, and stability and control, in a design oriented context.

**Terms Taught:** Winter 2008, Winter 2009

### 9.3 AER1415: Optimization Concepts and Applications

**Description:** This is a graduate course that I developed. The course covers a broad range optimization algorithms that includes not only gradient-based algorithms, but also genetic algorithms and other gradient-free methods. Sensitivity analysis methods are also taught. Multidisciplinary optimization (MDO) is taught towards the end of the course, which incorporates my latest research and culminates with an assignment involving a simplified aircraft MDO problem.

**Terms Taught:** Winter 2004, Fall 2004, Fall 2005, Fall 2006, Winter 2008, Fall 2008

### 9.4 AE588: Multidisciplinary Design Optimization

**Description:** This is a graduate course based on the AER1415 described above. The computational assignments were modified to include an aircraft design problem that illustrates the material in the various chapters.

**Terms Taught:** Winter 2010, Winter 2011, Winter 2012, Winter 2014

### 9.5 AE481: Aircraft Design

**Description:** This is an undergraduate capstone course that consists in performing a design project. In the two years that I have taught this course, I have focused on environmentally friendly airliner projects.

**Terms Taught:** Fall 2009, Fall 2010, Fall 2011, Fall 2012, Fall 2013, Fall 2014

### 9.6 AE510: Finite Elements I

**Description:** This is a graduate course on structural finite elements.

**Terms Taught:** Winter 2013, Winter 2015

## 10 Memberships in Professional Societies

- AIAA Lifetime Associate Fellow
- Royal Aeronautical Society
- Society for Industrial and Applied Mathematics