PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering
Department of Aerospace Engineering

Approved by the Regents May 21, 2015

Joaquim R.R.A. Martins, associate professor of aerospace engineering, with tenure, Department of Aerospace Engineering, College of Engineering, is recommended for promotion to professor of aerospace engineering, with tenure, Department of Aerospace Engineering, College of Engineering.

Academic Degrees:

Ph.D.	2002	Stanford University, Department of Aeronautics and Astronautics, Stanford, CA
M.S.	1997	Stanford University, Department of Aeronautics and Astronautics, Stanford, CA
M.Eng.	1995	Imperial College, Department of Aeronautics, London, UK

Professional Record:

2012–present	Associate Professor (with tenure), Department of Aerospace Engineering, University of Michigan
2009–2012	Associate Professor (without tenure), Department of Aerospace Engineering, University of Michigan
2008–2009	Associate Professor (with tenure), University of Toronto, Institute for Aerospace Studies, Ontario, Canada
2002–2008	Assistant Professor, University of Toronto, Institute for Aerospace Studies, Ontario, Canada

Summary of Evaluation:
Teaching: Professor Martins' teaching record is excellent. He has taught Aircraft Design at the undergraduate level, and both Finite Elements and Multidisciplinary Design Optimization (MDO) at the graduate level. The MDO course was developed and introduced by him; he has also put his stamp on the aircraft design course, having been its sole instructor since 2010. Before coming to Michigan, he taught Advanced Mechanics of Structures, Aircraft Design, and Optimization Concepts and Applications at University of Toronto. Since 2011, his Q1 and Q2 scores for Aircraft Design have been over 4.0. This is in part due to his reorganization of the material in that class. This is a notoriously difficult course in which to get good student evaluations. Students refer to his passion for the material, and his accessibility and rapid response to questions outside of class time.

Research: Professor Martins' record of scholarly accomplishment is outstanding, with several high-quality papers. Several of his papers are in the "landmark" category. He has established himself as a leader in high-fidelity MDO for aerospace vehicle design by successfully solving problems that were deemed to be impossible only a few years ago. His reputation is approaching "star quality." His research funding is strong, and his Ph.D. student production is high in terms

of quality and quantity. He has published numerous journal articles in the best and most appropriate journals for his research topics. His over 85 conference papers are also presented in the most appropriate venues bringing notoriety to the department, college and university, as well as his personal reputation. External reviewers had many positive comments about Professor Martins' accomplishments and all support his promotion.

Recent and Significant Publications:

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.

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.

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.

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.

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.

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.

Service: Professor Martins is engaged and participating within his department as well as in several external roles within his research community. He has done outstanding work at the department level. He has been very involved at the professional level, not just in the U.S., but in Canada, England and Portugal, as well. In the department, he has served as graduate chair since 2012, after serving as a member of the graduate committee since 2009. This is the most demanding service job in the department, comprising graduate admissions, graduate fellowship and GSI assignments, GSRA appointment coordination, and overseeing graduate advising and the doctoral prelim exam. He has been very effective as chair of the committee, drastically increasing the diversity of incoming Ph.D. students in his department. He has also served as the department's point of contact for the Summer Undergraduate Research Experience and Summer Research Opportunity programs. Professionally, Professor Martins has been very active. He is currently associate editor for the *AIAA Journal* and *Optimization and Engineering*. He is also a review editor for the *Journal of Structural and Multidisciplinary Optimization*. He is very involved in organization of professional meetings, and has served as co-organizer and technical co-chair for a number of meetings in the U.S. and abroad. He is active in reviewing papers and proposals, and has been a regular session chair at a number of conferences. He has been a member of the AIAA MDO Technical Committee, and has also served on technical committees for the Royal Aeronautical Society, the World Congress on Structural and Multidisciplinary Optimization, and the Canadian Aeronautics and Space Institute. He has served on NSF review panels, and has been a co-organizer of the NSF workshop on "The Future of Multidisciplinary Design Optimization: Advancing the Design of Complex Systems."

External Reviewers:
Reviewer A: "In my opinion, Prof. Martins is the leading researcher in the field [of his cohort]. I would even go as far as saying that he might be the top researcher in his field."

Reviewer B: "Professor Martins is one of the (if not the top) rising stars in the aerospace MDO community…He is, in my opinion, one of the top aerospace engineering researchers in MDO today; his work on coupled adjoints and high-fidelity aerostructural optimization for MDO is unparalleled."

Reviewer C: "His algorithmic work in this field is of the highest quality and he always, always brings his algorithms to a satisfactory conclusion by applying them to problems of real world complexity (not toy problems like so many others) and making his software freely available to the community."

Reviewer D: "Quim certainly has an impressive CV in terms of publications, PhD students, grants and service, so even without knowing him I would have had no qualms about endorsing his promotion. However, based on my knowledge of his work and visibility, I am more enthusiastic about this endorsement than for any that I made in the past decade."

Reviewer E: "He has clearly emerged as a national and international presence in the field of MDO, and is recognized as a leader in the specific focus of these methods to the field of aerospace vehicle design."

Summary of Recommendation: Professor Martins is an excellent research mentor and teacher of high quality. He has become a leader in the area of multi physics optimization and is extremely well recognized by his peers. He is an outstanding department citizen and colleague with excellent service contributions. It is with the support of the College of Engineering Executive Committee that I recommend Joaquim R.R.A. Martins for promotion to professor of aerospace engineering, with tenure, Department of Aerospace Engineering, College of Engineering.

David C. Munson Jr.

David C. Munson, Jr.
Robert J. Vlasic Dean of Engineering
College of Engineering

May 2015