

Curriculum Vitae

Marcias Martinez Ph.D.

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Objectives

To become a national and international recognized researcher in the field of Smart Structures and Structural Health Monitoring for the Aerospace Industry

Education

Ph.D. in Mechanical Engineering

Carleton University **Ottawa, Canada** **January 2000 – May 2006**

Research: Finite Element Analysis of smart material structures and composites with piezoelectric materials.

Thesis title: Finite Element Model of Structures with Piezoelectric Elements.

Supervisor: Dr. Andrei Artemev

Master's in Mechanical Engineering

Carleton University **Ottawa, Canada** **September 1997–August 1999**

Research: Computer model of dendrite growth in three dimensions.

The computer model is based on the finite difference method and concentration differences of three elements to calculate the morphology of the dendrite.

Concentration on:

Advance engineering materials and active fibre composites,

Finite element analysis,

Computational metallurgy,

Bachelor of Mechanical Engineering

Carleton University **Ottawa, Canada** **Sept. 1991-July 1995**

Fourth Year Project: Developed a user-friendly program, Austi, to predict the time of austenization for complete formation of austenite from pearlite, without unnecessary grain growth.

ICONSA

Maracaibo, Venezuela

July 2004

Course in principles and applications of Natural Gas Engineering.

Additional Courses

University of California **Irvine, California, USA** **Sept. 1997–Aug. 1999**

Graduate courses in inviscid and viscous incompressible fluid mechanics.

Course content: Flow kinematics, potential flows and complex potentials, vorticity and circulation, Bernoulli's theorem, Crocco's theorem, Conformal, Joukowski and Schwarz-Cristoffel transformation.

Work Experiences

Research Officer – Full Time

Institute for Aerospace Research

National Research Council Canada Ottawa, Canada

2005–Present

Program Manager and primary researcher on the “Smart Patch Program.” The program consisted in the development of technology to determine the loads carrying capabilities of the patch and the ability of the sensors to detect disbanding conditions.

Program Manager and primary researcher on health monitoring systems for rotor wing (CH-149) and fixed wing aircrafts (CF-18).

Developer of Finite Element Analysis software in C and C++ for smart material applications.

Deputy Chair of the International Conference on Adaptive Structures and Technologies (ICAST), held in Ottawa, October 2007.

Program Manager – Full Time

CMP Design

Ottawa, Canada

2000–2005

Program Manager of the Zimac Laboratories division of Chateaugay Metal Products (CMP) Design.

Primary research engineer in charge of sustaining and improving the design of equipment used in patch bonding technology for aircraft structures such as CF-18, C-141 and CF-16.

Partnered with the National Research Council of Canada to sustain and improve the design of equipment to do retrogression re-aging, RRA, of aluminum structures. RRA is used as a means for increasing the corrosion resistance of the material while sustaining the strength of the structure.

Designed Midplanes/Backplanes and other PCB cards using PCB tools (Pro-E 2000i). For high-speed telecommunication systems.

Performed CFD/Thermal Analysis on telecommunication systems and military equipment for efficient air ventilation and heat removal using Flotherm V3.1.

Designed sheet metal shelves to incorporate Nortel cards maintaining EMI containment while allowing air flow for heat removal.

Conducted mathematical analysis of tolerances and forces on latching mechanisms.

Created complete documentation packages of the designs as per Nortel Network's standards.

Sessional Lecturer, MAAE 4500- Feedback and Control Systems

Carleton University

Ottawa, Canada

2004-2007

Lectured 4th year undergraduate students on the principles and applications of feedback and control system and design of PID controllers using Matlab.

Student course evaluation:

Fall 2007-2008 (4.12/5)

Fall 2006-2007 (4.02/5)

Fall 2005-2006 (4.22/5)

Fall 2004-2005 (4.08/5)

Sessional Lecturer, Pro-Engineer 2000 i² – Part Time

Algonquin College

Ottawa, Canada

2001–2004

Taught students the use of Pro Engineer 2000 i² as a mechanical design tool.

Sessional Lecturer, MAAE 88.475 - CAD/CAM Course
Carleton University **Ottawa, Canada** **2000–2001**

Lectured students on the use CAD/CAM technology and Pro/E as a design engineering tool.

Student course evaluation (4.22/5)

Process Engineer – Full Time
WorldHeart, Inc. **Ottawa, Canada** **1998–2000**
Test Engineer.

Qualified and characterized axial flow pumps for artificial hearts.

Performed theoretical analysis on electrical, mechanical and hydraulic efficiencies, and verified the results experimentally.

Designed fixtures and surgical tools using Pro-Engineer version 19 and 2000i

Assisted in the design of components for the artificial heart.

Created process procedures and the device history records for ISO 9000 qualification.

Manufacturing Engineering
Unit Instruments, Inc. **Yorba Linda, CA, USA** **1995–1997**
Project Manager.

Qualified, validated for manufacturing, and implemented new products (UFC- 8100 and UFC 8260) from an estimated six months of work to three months.

Project Manager: data acquisition and control for a DI water system.

Evaluated and improved utilizing SPC to increase quality, throughput, and efficiency. By utilizing process improvement tools, cleanliness levels in stainless steels parts were increased from 900 ppb. to less than 100 ppb.

Publications & Presentations

Publications in Peer Reviewed Journals:

M. Martinez, R. Kernaghan, A. Artemev, “Finite Element Analysis of Broken Fiber Effects on Hollow Active Fiber Composites”, *Accepted for publication in the Journal of Intelligent Material Systems and Structures*, August 2009.

N.C. Bellinger and M. Martinez, Book Title: “Environmental Monitoring of Aircraft”, in *Encyclopedia of Structural Health Monitoring*, Boller, C., Chang, F. and Fujino, Y. (eds), John Wiley & Sons Ltd, Chichester, UK, pp. 1523-1530

M. Martinez, A. Artemev, “Finite Element Analysis of Broken Fiber Effects on the Performance of Active Fiber Composites”, *Published in the Journal of Composites Structures* 2008. Available online 20 June 2008, Volume 88, Issue 3, May 2009, Pages 491-496.

M. Genest, M. Martinez, N. Mrad, G. Renaud, “Pulsed Thermography for Non-destructive Evaluation and Damage Growth Monitoring of Bonded Repairs”, JA-SMPL-2007-0088, Accepted in the *Journal of Composites Structures* 2008, Available online 19 February 2008.

Martinez M., Artemev A., “Three Dimensional Computer Model of Dendrite Growth in Al-Si-Cu tertiary alloys”, *The Scientific Committee, 12th ICMCM Chicago, USA Mathematical modeling and Scientific Computing Vol. 13, No. 3, Page 247, 2001.*

Conference Papers

Wickramasinghe, V., Chen, Y., Martinez, M., Kernaghan, R., Wong, F. "Design and Verification of a Smart Wing for a Micro-Air-Vehicle", 17th AIAA/ASME/AHS Adaptive Structures Conference From 5/4/2009 To 5/7/2009,

Martinez, M., Chen, Y., Wickramasinghe, V., Wong F. "Adaptive Airfoil Wing for Micro UAV Flight Control", 19th International Conference on Adaptive Structures and Technologies From 10/6/2008 To 10/9/2008., Ascona Switzerland.

Wickramasinghe, V., Chen, Y., Nejad-Enas, M., Martinez, M. and Wong, F. "Verification of a Smart Wing Design for a Micro-Air-Vehicle through Simulation", CANSIMART 2008: 11th International Workshop on Smart Material and Structures, From 10/23/2008 To 10/24/2008.

Martinez M, Gang Li, Backman D., Oudovikine A, and Bellinger N. "Crack Detection on Composite and Metallic Aerospace Structures", 4th European Workshop on Structural Health Monitoring from 07-02-2008 till 07-04-2008, Krakow, Poland, CPR-SMPL-2008-0034

M. Martinez, T. Marincak, T. Benak and N.C. Bellinger, "Prototype Installation of a Surface Mountable Crack Sensor", Aging Aircraft Conference 2008, 04-20-2008 till 04-24-2008, Phoenix, AZ, USA, CP-SMPL-2007-0184.

Renaud, G., Martinez, M., and Backman, D., Finite Element Design and Analysis of a Damage Prone Bonded Patch for Disbond Sensing Applications, 22nd Annual Technical Conference of the American Society for Composites From 9/17/2007 To 9/19/2007, CPR-SMPL-2007-0110, 2007

Backman D., Martinez M., Renaud G., Genest M., Chisholm, K., "Thermoelastic Stress Analysis to Detect Disbonding in a Composite Patch", Submitted for publication in the Society of Experimental Mechanics, 06/03/2007 to 06/06/2007.

Martinez M., Renaud G., Backman D., Genest M., Delannoy M., "Demonstration of an Instrumented Patch", 14th International Symposium on: Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring (SPIE Symposium) From the 3/18/2007 to 3/23/2007. Submitted for publication.

M. Martinez, A. Artemev, F. Nitzsche and B. Geddes, "Finite Element Modeling of Actuated Fibre Composites" Proceedings of Third International Conference on High Performance Structures and Materials HPSM 2006. 3-5 May 2006, Ostend, Belgium. Published by WIT Press, Ed. C.A. Brebbia, 2006, p. 103-110.

M. Melnykowycz, M. Martinez, F. Nitzsche, M. Barbezat, and A. Artemev, "Active Airfoil Design and Finite Element Analysis of Smart Structures for Rotor Blade Applications" Proceedings of 16th International Conference on Adaptive Structures and Technologies, Paris, France, October 9-12 2005, DEStech Publications, p. 182-189.

M. Martinez, M. Melnykowycz, A. Artemev, and F. Nitzsche, Finite Element Analysis of Actuated Fiber Composites. Proceedings of CANSIMART 2005, International Workshop on Smart Materials & Structures. 13-14 October 2005, Toronto, Ontario, Canada. p. 231- 240

Technical Reports:

Backman, D., Martinez, M., Renaud, G., and Genest, M., "The use of Digital Image Correlation and Thermoelastic Stress Analysis for Detecting Disbonding in a Composite Repair", LTR-SMPL-2007-0039, February 2007.

Renaud, G., Martinez, M., and Backman, D., "Demonstration of an Instrumented Patch Phase I - Damage Prone Patch Design and Analysis", LTR-SMPL-2006-0225, Dec-2006

M. Martinez, Genest, M., Renaud, G., and Backman, D., "Demonstration of an Instrumented Patch - Phase I", LTR-SMPL-2006-0226, Dec-2006

M. Martinez, "A CH149 Tail Rotor Half Hub Feasibility Proposal Study on an In-Flight Damage Detection System Development", RP-SMPL-2005-0218, Ottawa, Canada, Published 01/16/06

M. Martinez, M. Delannoy, "Bonded Health Monitoring of an Instrumented Patch on FT193", LM-SMPL-2006-0150, Ottawa, Canada, Published 8/23/2006.

M. Martinez, "A Parametric Study of the Behavior of a New Shell Element"
Referenced as part of a journal paper by Prof. McDill at The Scientific Committee, 12th ICMCM, Mathematical modeling and Scientific Computing Chicago, USA, August 2-5th 1999.

Presentations:

University of Bristol, Bristol England November 2007
Finite Element Analysis of Broken Fibers in Active Fiber Composites.

Aircraft Structural Working Group for P-3, Santa Rosa California, June 18-21 2007

Presentation titled: Surface Mountable Crack System. I was invited by the Canadian Forces to present NRC technology at an international forum attended by USA, Norway, Australia, Netherlands, Germany and Canada.

Carleton University Pro-Engineer Seminar Ottawa, Canada July 19-21 1999
Seminar on Pro-Engineer Version 20.

11th Material Science Conference Kingston, Canada June 15-18 1999
Presented at the Royal Military College.

Abstract: Three Dimensional Cellular Model of the Dendrite Growth in Al-Si-Cu Alloys.

Student Supervision

Mr. Fady Habib

Carleton University Ottawa, Canada May 2009 to Present
Master Thesis: Structural Health Monitoring of Bonded Composite Joints

Mr. Robert Kernaghan

Carleton University Ottawa, Canada September 2008 to Present
Master Thesis: Finite Element Analysis of Morphing Structures

Mr. Terence Cheung

Carleton University **Ottawa, Canada** **January 2008 to Present**

Master Thesis: Delamination Growth Prediction in Composite Patched Repairs

Dr. Martinez has supervised a total of 3 undergrad industrial experience program students during his time at NRC.

References:

Available upon request.