

Curriculum Vitae

Dr.-Ing. Saullo G. P. Castro



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Formal Academic Education

- PhD, Doctor of Engineering (Dr.-Ing.) with “summa cum laude” at the Technical University of Clausthal, Germany.
Date of defense: 9th of December 2014, 11:00 AM
- Feb. 2012 – Dec. 2014
- Thesis: “Semi-Analytical Tools for the Analysis of Laminated Composite Cylindrical and Conical Imperfect Shells under Various Loading and Boundary Conditions”
 - Advisor: Prof. Dr.-Ing. Gerhard Ziegmann
 - Co-advisors: Prof. Dr.-Ing. Richard Degenhardt
Prof. Dr.-Ing. habil. Christian Mittelstedt
-
- Master of Science in Aeronautical Engineering at ITA (Aeronautical Technology Institute), São José dos Campos-SP, Brazil.
- Feb. 2008 – Sep. 2009
- Thesis: “Efficient Optimization of Composite Wing using Genetic Algorithms”
 - Advisor: Prof. Dr. José Antônio Hernandes
-
- Embraer SA, Engineering Specialization Program (PEE), São José dos Campos-SP, Brazil
- Oct. 2006 – Jan. 2008
- 1,023 hours of training in aerospace subjects
 - Focus on stress analysis. Group’s leader for the structural design
 - Calculated the study aircraft’s composite wing
 - Focal point for all aircraft’s CATIA drawings
-
- Bachelor in Material Engineering at USP – EEL, University of São Paulo, Lorena-SP, Brazil
- Jan. 2001 – Dec. 2005
- Finished with the second highest grade of his group (82%)
-
- Technician in Computer Science at CEETEPS (Educational Center Paula Souza), Cruzeiro-SP, Brazil
- Jan. 1999 – Dec. 2000

Academic Experience

Assistant Professor at Delft University of Technology

Department of Aerospace Structures and Materials

June 2018 – Present

- Research on advanced composite design and meshless methods coupled with finite elements for fluid-structure interaction
- Lecturer for bachelor's courses:
 - Engineering Mechanics: Dynamics (2018-2019) 3 EC
- Lecturer for master's courses:
 - Structural Analysis and Stability II (2019) 3 EC
- DSE coach
 - First time that a DSE group implemented an automated verification process of all aircraft models, integrated with the code development

Postdoctoral Researcher in Aeronautical Engineering, Computational Solid Mechanics, Technology Institute of Aeronautics – ITA, São José dos Campos – SP, Brazil

Aug. 2015 – May 2018

- Development of semi-analytical models for panel flutter calculation, in partnership with the Federal University of Uberlândia (UFU), applying aerodynamic's piston theory and classical laminated plate theory, resulting in a Journal paper
- Development of a method that allows the assembly of semi-analytical models, making it easy to apply fast semi-analytical tools to complex domains with discontinuities and cutouts, resulting in a Journal paper
- Development of meshfree methods (Edge-based Smoothed Point Interpolation Method – ES-PIM) to calculate buckling and vibration of any structure that can be discretized by 2D shell elements or 3D tetrahedral elements
- Co-advisor of 6 Master students

Research Assistant at the Private University of Applied Sciences Göttingen (PFH) during the 7th European Framework Project: “DESICOS”

Feb. 2012 – Jan. 2015

- Participation in 8 project meetings
- Participation in DESICOS closing conference between 25th and 27th of March 2015 in Braunschweig, Germany.
 - chairman of keynote session on the 26th of March
 - presentation of 4 studies developed during the project
- Investigated effect of geometric and load imperfections on the instability behavior of thin-walled cylindrical and conical shells, stiffened and unstiffened
- Leader developer of DESICOS improved software (Abaqus plugin written in Python, available at <https://github.com/desicos/desicos>)
- Planning of short- and mid- term research activities
- Keynote speaker at CIMS 2012 in Glasgow, Scotland, delegated by Prof. Dr.-Ing. Richard Degenhardt, with the work “Future Structural Stability Design for Composite Space and Airframe Structures”, which ultimately resulted in a journal paper
- Participation in international conferences
- Mentor and external evaluator of 2 Master students in Germany

PhD-related Experience

Feb. 2012 – Jan. 2015

- Nonlinear theory of plates and shells, classical and first-order shear deformation theories, with shear correction factors
- Calculus of variations applied to first and second variation of energy potential, deriving static and buckling equations, respectively
- Linear and nonlinear analysis of plates, cylindrical shells and conical shells, using static and dynamic implicit equations. Derivation of semi-analytical models for these purposes
- Application of geometric imperfections and thickness imperfections to semi-analytical models
- Application of asymmetric loading conditions in semi-analytical models
- Advanced application of Python, Cython, C/C++ and Fortran programming capabilities to achieve state-of-the-art performance standards with semi-analytical models

Industry Experience

Embraer SA, Product Development Engineer: Stress Analysis, CAE Specialist

- Project leader for Embraer's new stress analysis platform
 - Developed new method structural mapping, allowing a high degree of automation. Improved standardization among different stress analysis groups, facilitating knowledge communality and interchangeability
 - Developed new method to obtain finite element internal forces from mapped structural elements, allowing automation and the extraction of massive amounts of data efficiently
 - Developed new concept of structural analysis solvers that consist in executable subroutines containing Embraer's main stress analysis processes, outputting margins of safety
 - Certification process facilitated by full traceability of analysis methods and processed data
- Jan. 2015 – May 2018
 - Use of high-performance computing
- Project leader for Embraer's next generation Fatigue Solver and Fatigue Calculation Process
 - Dispenses need of stress transfer functions
 - State of the art accuracy for fatigue analysis
 - Considers dynamic effects on fatigue behavior
- Project management performed with the Agile concept using JIRA
- Specialist in management and version control of engineering methods, tools and processes
- Jul. 2010 – Jan. 2012 Instructor for internal courses at Embraer
 - Linear and nonlinear finite element analysis (40h)
 - Structural optimization using advanced constraints in Nastran's SOL 200(40h)
 - Static condensation for efficient global-local analyses (40h)

Embraer SA, Product Development Engineer: Stress Analysis, CAE Specialist

(continued)

- Consultant for stress analysis teams in linear and non-linear analyses, static, dynamic and transient; mainly in Nastran, Abaqus and Marc and its related pre- and post- processors (FEMAP, PATRAN, Hypermesh, Abaqus CAE)
 - Development of various automations for Embraer's design groups using CATIA (C++ and VBA)
 - Coupling of energy-based semi-analytical methods implemented in Fortran into structural optimization procedures (Nastran and Optistruct), allowing the calculation of the following stress analysis constraints: buckling, crippling, post-buckling with diagonal tension, column buckling considering the effective width
 - Development of new stress analysis methods and processes, mostly related to buckling, post-buckling and fatigue, with a close relationship with Embraer's Chief Engineering group
 - Development and application of methods to generate distributed loads in structural tests based on integrated loads consisting of shear and bending moments
- Jan. 2015 – May 2018

Embraer SA, Product Development Engineer: Stress Analysis, CAE Specialist

- Jul. 2010 – Jan. 2012
- Engineering consulting to stress analysis groups:
 - Linear, nonlinear, static and transient simulations in the following solvers: MSC Nastran, MSC Marc Abaqus, Optistruct
 - Pre- and Post- Processing: FEMAP, Patran, Abaqus CAE, HyperMesh
 - Development of KBE design tools for metallic wing boxes to Embraer's preliminary design group (VBA Programming in CATIA, Python, TCL Programming in HyperMesh, MSC SimXpert)
 - Development of various analysis methods and automated processes for Embraer's stress analysis groups
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Embraer SA, Product Development Engineer: Stress Engineer

- Feb. 2008 – Jul. 2010
- Calculation of composite parts for aircraft floor and cabin
 - Development of finite element models for various metallic and composite parts
 - Development of new enveloping technique that allows the evaluation of all range of possible aircraft interior configurations, reducing costs with stress analysis certification (ModeFrontier, VBA Programming in Excel, MSC Nastran)
 - Development of new method to calculate reaction loads at cargo attachments and ropes for any general tie down configuration

Chapter in Books

Book: Stability and Vibrations of Thin-Walled Composite Structures [View/Download](#)

ISBN: 9780081004104

Edited by Haim Abramovich

Technion, I.I.T., Haifa, Israel

Authored Chapter 7: Stability of Composite Shell-Type Structures [View/Download](#)

7.2 Geometric imperfections and lower-bound methods used to calculate knockdown factors for composite cylindrical shells

7.3 Semianalytical approaches for linear and nonlinear buckling analyses of imperfect composite cylinders under axial, torsional, and pressurization loads

Publications in Indexed Journals

Saullo G. P. Castro, Mauricio V. Donadon, Thiago A. M. Guimarães. "ES-PIM applied to buckling of variable angle tow laminates". Composite Structures, Vol. 209, Pages 67-78, 2019. [View/Download](#)

Thiago A. M. Guimarães, Saullo G. P. Castro, Domingos A. Rade, Carlos E. S. Cesnik. "Supersonic Flutter and Buckling Optimization of Tow Steered Composite Plates". AIAA Journal, Vol. 57 No. 1, Pages 397-407, January 2018. [View/Download](#)

Odeny Dias de Matos Junior, Mauricio V. Donadon, Saullo G. P. Castro. "Aeroelastic Behavior of Stiffened Composite Laminated Panel with Embedded SMA Wire using the Hierarchical Rayleigh–Ritz Method". Composite Structures, Vol. 181, Pages 26-45, December 2017. [View/Download](#)

Regina Khakimova, Saullo G. P. Castro, Dirk Wilckens, Klaus Rohwer, Richard Degenhardt. "Buckling of axially compressed CFRP cylinders with and without additional lateral load: experimental and numerical investigation". Thin-Walled Structures, Vol. 119, Pages 178-189, October 2017. [View/Download](#)

Saullo G. P. Castro, Thiago A. M. Guimarães, Domingos A. Rade, Maurício V. Donadon. "Flutter of stiffened composite panels considering the stiffener's base as a structural element". Composite Structures, Vol. 140, Pages 36-43, April 2016. [View/Download](#) [Audio Slides](#)

- Saullo G. P. Castro, Maurício V. Donadon. "Assembly of Semi-Analytical models to Address Linear Buckling and Vibration of Stiffened Composite Panels with Debonding Defect". *Composite Structures*, [Vol. 160](#), Pages 232–247, January 2017. [View/Download](#)
- Maria Francensca Di Pasqua, Regina Khakimova, Saullo G. P. Castro, Mariano A. Arbelo, Aniello Riccio, Antonio Raimondo Richard Degenhardt. "Investigation on the geometric imperfections driven local buckling onset in composite conical shells". *Applied Composite Materials*, Vol. 23, Issue 4, Pages 879-897, August 2016. [View/Download](#)
- Regina Khakimova, Florian Burau, Richard Degenhardt, Mark Siebert, Saullo G. P. Castro. "Design and manufacture of conical shell structures using prepreg laminates". *Applied Composite Materials*. (2016) 23: 289. [View / Download](#)
- Kaspars Kalnins, Mariano A. Arbelo, Olgerts Ozolins, Eduards Skukis, Saullo G. P. Castro, Richard Degenhardt. "Experimental non-destructive test for estimation of buckling load on unstiffened-cylindrical shells using vibration correlation technique". *Shock and Vibration*, Vol. 2015, Article ID 729684, 8 pages. [View/Download](#)
- Mariano A. Arbelo, Kaspars Kalnins, Olgerts Ozolins, Eduards Skukis, Saullo G. P. Castro, Richard Degenhardt. "Experimental and numerical estimation of buckling load on unstiffened cylindrical shells using a vibration correlation technique". *Thin-Walled Structures*, Vol. 94, Pages 273-279, September 2015. [View/Download](#)
- Saullo G. P. Castro, Christian Mittelstedt, Francisco A. C. Monteiro, Mariano A. Arbelo, Richard Degenhardt, Gerhard Ziegmann. "A semi-analytical approach for linear and non-linear analysis of unstiffened laminated composite cylinders and cones under axial, torsion and pressure loads". *Thin-Walled Structures*, Vol. 90, Pages 61-73, May 2015. [View/Download](#) [Audio Slides](#)
- Saullo G. P. Castro, Christian Mittelstedt, Francisco A. C. Monteiro, Richard Degenhardt, Gerhard Ziegmann. "Evaluation of non-linear buckling loads of geometrically imperfect composite cylinders and cones with the Ritz method". *Composite Structures*, Vol. 122, Pages 284-299, April 2015. [View/Download](#) [Audio Slides](#)
- Mariano A. Arbelo, Annemarie Herrmann, Saullo G. P. Castro, Regina Khakimova, Rolf Zimmermann, Richard Degenhardt. "Investigation of buckling behavior of composite

shell structures with cutouts". Applied Composite Materials, November 2014. [View/Download](#)

Saullo G. P. Castro, Christian Mittelstedt, Francisco A. C. Monteiro, Mariano A. Arbelo, Gerhard Ziegmann, Richard Degenhardt. "Linear buckling predictions of unstiffened laminated composite cylinders and cones under various loading and boundary conditions using semi-analytical models". Composite Structures, Vol. 118, Pages 303-315, December 2014. [View/Download](#) [Audio Slides](#)

Regina Khakimova, Christopher J. Warren, Rolf Zimmermann, Saullo G. P. Castro, Mariano A. Arbelo, Richard Degenhardt. "The single perturbation load approach applied to imperfection sensitive conical composite structures". Thin-Walled Structures, Vol. 84, Pages 369-377, November 2014. [View/Download](#)

Maria Francesca Di Pasqua, Regina Khakimova, Saullo G. P. Castro, Mariano A. Arbelo, Aniello Riccio, Richard Degenhardt. "The influence of geometrical parameters on the buckling behavior of conical shells by the single perturbation load approach". Applied Composite Materials, Vol. 22, Issue 4, Pages 405-422, August 2015. [View/Download](#)

Richard Degenhardt, Saullo G. P. Castro, Mariano A. Arbelo, Rolf Zimmermann, Regina Khakimova, Alexander Kling. Future structural stability design for composite space and airframe structures. Thin-Walled Structures, Vol. 81, Pages 29-38, August 2014. [View/Download](#)

Mariano A. Arbelo, Sérgio F. M. de Almeida, Maurício V. Donadon, Sandro R. Rett, Richard Degenhardt, Saullo G. P. Castro, Kaspars Kalnins, Oļģerts Ozoliņš. Vibration correlation technique for the estimation of real boundary conditions and buckling load of unstiffened plates and cylindrical shells. Thin-Walled Structures, Vol. 79, Pages 119-128, June 2014. [View/Download](#)

Mariano A. Arbelo, Richard Degenhardt, Saullo G. P. Castro, Rolf Zimmermann. Numerical characterization of imperfection sensitive composite structures. Composite Structures, Vol. 108, Pages 295-303, February 2014. [View/Download](#)

Saullo G. P. Castro, Rolf Zimmermann, Mariano A. Arbelo, Regina Khakimova, Mark W. Hilburger, Richard Degenhardt. Geometric imperfections and lower-bound methods used

to calculate knock-down factors for axially compressed composite cylindrical shells. *Thin-Walled Structures*, Vol. 74, Pages 118–132, January 2014. [View/Download](#)

Saullo G. P. Castro, Rolf Zimmermann, Mariano A. Arbelo, Richard Degenhardt. Exploring the constancy of the global buckling load after a critical geometric imperfection level in thin-walled cylindrical shells for less conservative knock-down factors. *Thin-Walled Structures*, Vol. 72, Pages 76–87, November 2013. [View/Download](#)

Publications in Conference Proceedings

Thiago A. Guimaraes, Saullo G. P. Castro, Domingos A. Rade, and Carlos E. Cesnik. "Panel Flutter Analysis and Optimization of Composite Tow Steered Plates", 58th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, AIAA SciTech Forum, (AIAA 2017-1118). [View/Download](#)

Kaspars Kalnins, Mariano Arbelo, Olgerts Ozolins, Saullo Castro, Richard Degenhardt. "Numerical characterization of the knock-down factor on unstiffened cylindrical shells with initial geometric imperfections", Proceedings of the 20th International Conference on Composite Materials, Copenhagen, Denmark, July 19-24, 2015. [View/Download](#)

Regina Khakimova, Rolf Zimmermann, Florian Burau, Marc Siebert, Mariano A. Arbelo, Saullo G. P. Castro, Richard Degenhardt. "Optimization of the manufacturing process of conical shells structures using prepreg laminates". Proceedings of the European conference on spacecraft structures, materials & environmental testing", Braunschweig , Germany. April 1-4, 2014

Kaspars Kalnins, Olgerts Ozoliņš, Mariano A. Arbelo, Saullo G. P. Castro, Richard Degenhardt. "Experimental characterization of buckling on composite cylinders shells with eccentric supports". Proceedings of the European conference on spacecraft structures, materials & environmental testing", Braunschweig , Germany. April 1-4, 2014.

Regina Khakimova, Saullo G. P. Castro, Mariano A. Arbelo, Richard Degenhardt, Klaus Rohwer, Rolf Zimmermann, Gerrit Quappen, Svend Hinsch "Studies of Imperfection Sensitive Conical Composite Structures". 21st International Annual Conference on Composites Engineering (ICCE), Tenerife, Spain. July 21-27, 2013.

Mariano A. Arbelo, Rolf Zimmermann, Saullo Castro, Richard Degenhardt. "Comparison of new Design Guidelines for Composite Cylindrical Shells prone to Buckling". Proceedings of the ICCST-9 Conference, Sorrento, Italy. April 24-26, 2013.

Vinicius L. Lemos, Saullo G. P. Castro, José A. Hernandez. "Integrating automatic zone modeling with GA in a two-step approach for structural optimization of a composite wing". Proceedings of the 3rd International Conference on Engineering Optimization

(ENGOPT), Rio de Janeiro, Brazil. July 1 - 5, 2012. [View/Download](#) [Poster View/Download](#)

Thiago A. M. Guimaraes, José A. Hernandez, Saullo G. P. Castro. "Multi spar composite vertical empennage structure optimization". Proceedings of the 2nd International Conference on Engineering Optimization (ENGOPT), Lisbon, Portugal. September 6 - 9, 2010. [View/Download](#)

Saullo G. P. Castro, Thiago A. M. Guimaraes, José A. Hernandez. "Comparison of free stacking sequence approach (T-THETA) versus a predefined 0/+45/-45/90 sequence in a typical aircraft wing optimization". Proceedings of the 2nd International Conference on Engineering Optimization (ENGOPT), Lisbon, Portugal. September 6 - 9, 2010. [View/Download](#) [Poster View/Download](#)

Saullo G. P. Castro, Thiago A. M. Guimaraes, José A. Hernandez. "Composite optimization performance comparison between Genesis's BIGDOT and modeFRONTIER's MOGA II algorithms". Proceedings of the VI Congresso Nacional de Engenharia Mecânica (CONEM), Campina Grande-PB, Brazil. August 18 - 21, 2010. [View/Download](#) [Poster View/Download](#)

Saullo G. P. Castro, José A. Hernandez, Flávio L. S. Bussamra, Wagner M. Ponciano. "Finding optimal genetic algorithm parameters for a composite wing optimization". Proceedings of the 11th Pan-American Congress of Applied Mechanics (PACAM XI), Foz do Iguacu-PR, Brazil. January 4 - 8, 2010. [View/Download](#) [Slides View/Download](#)

Saullo G. P. Castro, José A. Hernandez, Eliseu Lucena Neto. "Otimização eficiente de asa em material compósito via algoritmo genético". Congresso de Métodos Numéricos em Engenharia (METNUM), Barcelona, Spain. June 29 - July 2, 2009. [View/Download](#) [Slides View/Download](#)

Saullo G. P. Castro, José A. Hernandez, Eliseu Lucena Neto. "Composite wing optimization with progressive mesh refinement". Proceedings of COBEM 2009. 20th International Congress of Mechanical Engineering (COBEM), Gramado-RS, Brazil. November 15 - 20, 2009. [View/Download](#) [Poster View/Download](#)

Contributions to Public Software ([see here](#))

Saullo G. P. Castro. Computational Mechanics Tools. Version 0.7.2, 29th of August 2016. [Online]. Available: <http://compmech.github.io/compmech/>.

Saullo G. P. Castro, Jasper Reichardt, Florian Burau, et. al, "DESICOS Improved Software Version 2.4.10," 29th of August 2017. [Online]. Available: <https://github.com/desicos/desicos>.

Steve Doyle, Saullo G. P. Castro. PyNastran. Version 1.0.0, 25th of May 2017. [Online]. Available: <https://github.com/stevedoyle2/pynastran>.

Saullo G. P. Castro, Anton Loukianov. Cubature. Version 0.13.3, 29th of May 2017. [Online]. Available: <https://github.com/saullocastro/cubature>.

Saullo G. P. Castro. Meshless Methods for Computational Mechanics. Version 0.1.19, 17th of May 2017. [Online]. Available: <https://github.com/compmech/meshless>.

My Stack Overflow Profile (click on image below to open it), **affected over 4 million people with my contributions** related to computer science and programming:

