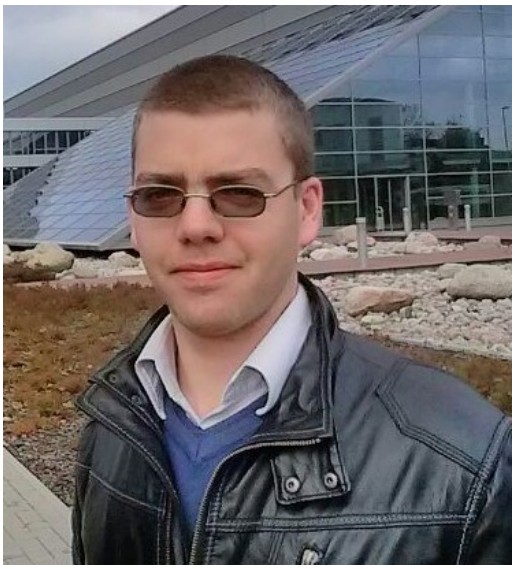

Dr. Mariano Andrés Arbelo

See:
http://www.bv.fapesp.br/pt/pesquisador/34975/mariano-andres-arbelo/

Division of Mechanical Engineering (IEM)
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Biography:
Graduated in Ingenieria Aeronautics - National University of La Plata (2006), master's degree in Aeronautical and Mechanical Engineering from the Technological Institute of Aeronautics (2008) and a PhD in Aeronautical and Mechanical Engineering from the Technological Institute of Aeronautics (2012). He is currently associate researcher at the Institute of Aeronautical Technology. He has experience in Mechanical Engineering with emphasis in Solid Mechanics

Theses for MS and PhD degrees:
“Development panel design procedures strengthened in aircraft structures of composite material”, Ph.D thesis, Division of Mechanical Engineering (IEM), Technological Institute of Aeronautics (ITA), Ministry of Defence, Brazil, 2011
SUMMARY: In this work the numerical and experimental investigation of the structural behavior-glued panels boosters or co-cured manufactured in composite materials subject to different loading conditions. The objective and the main original contribution of this work is the development of robust design procedures for reinforced composite panels for applications aeronáuticas. The experimental part will be carried out by means of two sets of well-defined tests. The first is oriented to the numerical model validation tests delamination in Mode I, Mode II and Mixed Mode I / II, as standardized in the industry for characterization of the material. The second, focused to study structures sub type panels reinforced with bonded or co-cured interfaces. Will be made after buckling tests with compression loading, pure shear, loading combining bending - shear and bending test in seven points. In this second set of studies, testing methodologies will be proposed in order to obtain reliable and

reproducible results. Be established: Definition of the test specimens, testing mechanisms, data acquisition and analysis methodologies obtidos.Na numerical results of a series of numerical modeling is performed by implementing damage models that are predictive of initiation and Propagation characteristic of the failure modes in structures made from composites, including the effects of interface delamination of the panel - reinforcer the finite element ABAQUS / EXPLICIT, in order to obtain results that accurately represent the experimental results.

"Structural behavior of laminated panels in composite materials subjected to shear loads in the plane", Master's Thesis, Technological Institute of Aeronautics (ITA), Ministry of Defence, Brazil, 2008
SUMMARY: This paper proposes the numerical and experimental investigation of the structural behavior of laminated panels in composite materials subjected to shear loads in the plane. The goal of the proposed work is to develop a test device for laminated panels subjected to in-plane shear loads, to identify out-of-plane deformations in the post buckling regime by contactless optical instruments and to correlate the values obtained with the numerical model. A test methodology is proposed in order to obtain reliable and reproducible results. The numerical models will be constructed using the ABAQUS / Standard software package.

Selected Publications:
M. Arbelo, K. Kalnins, O. Ozolin, S. Castro, R. Degenhardt (ITA, RTU, DLR), "Buckling of imperfection sensitive shell structures: experimental characterization of the knock-down factor using the Multiple Perturbation Load Approach", Third International Conference on Buckling and Postbuckling behavior of Composite Laminated Shell Structures with DESICOS Workshop, 25-27 March, 2015

S. G. P. Castro, C. Mittelstedt, F. A. C .Monteiro, M. A. Arbelo , R. Degenhardt, G. Ziegmann (PFH, DLR, TU Clausthal. Sogeti), "A semi-analytical approach for linear and non-linear analysis of unstiffened laminated composite cylinders and cones under axial, torsion and pressure loads", Third International Conference on Buckling and Postbuckling behavior of Composite Laminated Shell Structures with DESICOS Workshop, 25-27 March, 2015

S. G. P. Castro, C. Mittelstedt, M. A. Arbelo , R. Degenhardt, R. Khakimova, M. W. Hilburger, G. Ziegmann (PFH, DLR, NASA, TU Clausthal), "Non-linear buckling response of unstiffened laminated composite cylinders using different geometric imperfections", Third International Conference on Buckling and Postbuckling behavior of Composite Laminated Shell Structures with DESICOS Workshop, 25-27 March, 2015

S. G. P. Castro, M. A. Arbelo , R. Degenhardt, G. Ziegmann (PFH, DLR, TU Clausthal. Sogeti), "Single perturbation load approach: new definition for P1 and explaining the constancy of the buckling load", Third International Conference on Buckling and Postbuckling behavior of Composite Laminated Shell Structures with DESICOS Workshop, 25-27 March, 2015

Arbelo, Mariano A .; De Almeida, Sergio Fm; Donadon, Mauricio V .; Rett, Sandro R .; Degenhardt, Richard; Castro, Saullo GP; Kalnins, Kaspars; Ozolins, Olgerts, "Vibration correlation technique for the estimation of real boundary conditions and buckling load of unstiffened plates and cylindrical shells", Thin-Walled Structures, v. 79, p. 119-128, June 2014.
SUMMARY: Nondestructive experimental methods to calculate the buckling load of imperfection sensitive thin-walled structures are one of the most important techniques for the validation of new structures and numerical models of large scale aerospace structures. Vibration correlation technique (VCT) allows determination of the equivalent boundary conditions and buckling load for several types of structures without

reaching the instability point. VCT is already widely used for beam structures but the technique is still under development for thin-walled plates and shells. This paper explains the capabilities and limitations of this technique currently applied to two types of structures under buckling conditions: flat plates and cylindrical shells prone to buckling. Experimental results for a flat plate and a cylindrical shell are presented together with reliable finite element models for both cases. Preliminary results show that the VCT can be used to determine the realistic boundary conditions of a given test setup, providing valuable data for the estimation of the buckling load by finite element models. Also numerical results are presented that the VCT can be used as a nondestructive tool to estimate the buckling load of unstiffened cylindrical shells. Experimental tests are topics under development to further validate the approach.

Arbelo, Mariano A .; De Almeida, Sergio Frascino M .; Donadon, Mauricio V, "Experimental and numerical analysis for the post-buckling behavior of composite shear webs", Composite Structures, v. 93, no. 2, p. 465-473, January 2011

SUMMARY: This paper presents the experimental and numerical detailed investigation on the structural behavior of stiffened composite panels subjected to in-plane shear loads The experimental work includes the development of a test device for post-buckling analyses of laminated panels subjected to shear loads. The panel's out-of-plane displacement field in the post-buckling regime was experimentally characterized using the non-contact 3-D optical device. The test procedure was to obtain reliable and reproducible results. The following parameters were established: geometry and instrumentation of the test specimens mechanisms, data acquisition procedures and analysis procedures for test data. The numerical objective of this work is to implement the modeling methodology for analysis of composite stiffened panels using finite elements. The proposed methodology takes into account large displacements and nonlinearity effects by using the equipment damage mechanics based on progressive failure model. Preliminary results for specimens tested with the proposed configuration indicate that the stiffened composite shear webs have significant post-buckling strength.