

CCTAE

**Centro de Ciências e Tecnologias
Aeronáuticas e Espaciais**

(Center for Aerospace Science and Technology)

**Summary of Activities
2013**

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Members

Researchers

- Luís Manuel Braga da Costa Campos (coordinator)
- Agostinho Rui Alves da Fonseca
- André Calado Marta
- Fernando José Parracho Lau
- Filipe Szolnoky Ramos Pinto Cunha
- João Manuel Gonçalves de Sousa Oliveira
- Joaquim Manuel Guerreiro Marques
- Pedro da Graça Tavares Álvares Serrão

I. Publications

Papers in Journals

1. L. M. B. C. Campos, M. H. Kobayashi, “On an acoustic oscillation energy for shear flows”, *International Journal of Aeroacoustics*, Volume: 12, Issue 1-2, pp 123-167, 2013. (DOI: 10.1260/1475-472X.12.1-2.123) [IF 2012: 0.627]
2. A.C. Marta, S. Shankaran, P. Venugopal, B. Barr and Q. Wang, “Interpretation of Adjoint Solutions for Turbomachinery Flows”, *AIAA Journal*, Vol.51, Issue 7, pp.1733–1744, July 2013. (DOI: 10.2514/1.J052177.) [IF 2012: 1.080]
3. A. C. Marta and S. Shankaran, “On the Handling of Turbulence Equations in RANS Adjoint Solvers”, *Computers & Fluids*, Vol.74, pp.102–113, March 2013. (DOI: 10.1016/j.compfluid.2013.01.012.) [IF 2012: 1.467]
4. M. Bras, J. Vale, F. Lau and A. Suleman 2013, “Flight Dynamics and Control of a Vertical Tail-less Aircraft”, *J. Aeronaut. Aerospace Eng.*, 2(4):119. (DOI: 10.4172/2168-9792.1000119)
5. J. Vale, F. Lau and A. Suleman 2013, “Energy Efficiency Studies of A Morphing Unmanned Aircraft”, *J. Aeronaut. Aerospace Eng.*, 2(4):122. (DOI: 10.4172/2168-9792.1000122.)
6. L. M. B. C. Campos and J. M. G. S. Oliveira, “On sound generation in cylindrical flow ducts with non-uniform wall impedance”, *International Journal of Aeroacoustics*, Volume: 12, Issue 4, pp 309-348, 2013. (DOI: 10.1260/1475-472X.12.4.309) [IF 2012: 0.627]

7. L. M. B. C. Campos and M. H. Kobayashi, "On sound emission by acoustic sources in a shear flow", *International Journal of Aeroacoustics* Volume 12, Number 7–8 (December 2013), pp 719-742, 2013. (DOI: 10.1260/1475-472X.12.7-8.719) [IF 2012: 0.627]
8. L. M. B. C. Campos and P. G. T. A. Serrão, "On the discrete and continuous spectrum of acoustic-vortical waves", *International Journal of Aeroacoustics* Volume 12, Number 7–8 (December 2013), pp 743-782, 2013. (DOI: 10.1260/1475-472X.12.7-8.743) [IF 2012: 0.627]

Communications to International Symposia

1. B. M. Tojo and A. C. Marta, Aero-Structural Blade Design of a High-Power Wind Turbine, AIAA 2013-1531, 9th AIAA Multidisciplinary Design Optimization Specialist Conference, Boston, Massachusetts, USA, April 2013. doi: 10.2514/6.2013-1531.
2. J. F. G. Coimbra and A. C. Marta, Aero-Acoustic Optimization of Airfoils for Wind Turbines, AIAA 2013-1601, 9th AIAA Multidisciplinary Design Optimization Specialist Conference, Boston, Massachusetts, USA, April 2013. doi: 10.2514/6.2013-1601.
3. L. M. B. C. Campos and A. C. Marta, Fundamental Bending Frequencies of Tapered Wings, AIAA 2013-1633, 54th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Boston, Massachusetts, USA, April 2013. doi: 10.2514/6.2013-1633.
4. J. Vale, F. Lau & A. Suleman 2013, Optimal control and energy balance evaluation of a morphing aircraft, 54th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, 8-11 April 2013, Boston, USA.
5. L.M.B.C. Campos & M.H. Kobayashi On an Hamiltonian for sound waves in boundary layers, International Conference on Structural Engineering Dynamics, Sesimbra, 17-19 June 2013.
6. L.M.B.C. Campos On a law of intensity of radiation for acoustic-vortical waves, International Conference on Structural Engineering Dynamics, Sesimbra, 17-19 June 2013.
7. L.M.B.C. Campos & F.S.R.P. Cunha On shock waves in a chemically reacting gas, International Conference on Structural Engineering Dynamics, Sesimbra, 17-19 June 2013.
8. L.M.B.C. Campos & J.M.G.S. Oliveira On the effect on far-field noise of a non-uniform liner in a nozzle, International Conference on Structural Engineering Dynamics, Sesimbra, 17-19 June 2013.
9. L.M.B.C. Campos & J.M.G. Marques "On the relation between air traffic capacity, separation and safety", Integration in air Transport, Ecole Nationale de L' Aviation Civile, Toulouse, 2013.
10. L.M.B.C. Campos & J.M.G. Marques On wake vortex separation distances: theory compared with regulations, Integration in air Transport, Ecole Nationale de L'aviation Civile, Toulouse, 2013
11. L.M.B.C. Campos & F.S.R.P. Cunha "On torsional vibrations of a rod with non-equilateral triangular cross-section", 11th International Conference on Vibration problems ICOVP-2013, Lisbon.
12. L.M.B.C. Campos "On a non-linear theory of buckling of elastic beams", 11th International Conference on Vibration Problems ICOVP-2013, Lisbon.

13. L.M.B.C. Campos “On four types of elastic instabilities of bars”, 11th International Conference on Vibration Problems ICOVP-2013, Lisbon.
14. L.M.B.C. Campos & P.G.T.A. Serrão “Sound refraction by stratification and wind in an atmosphere” 17th ASC-CEAS/X-NOISE EV Workshop, Seville, 2013.
15. L.M.B.C. Campos & F.S.R.P. Cunha “On the modification of the acoustic power spectra by atmospheric turbulence”. 17th ASC-CEAS/X-NOISE EV Workshop, Seville, 2013.
16. L.M.B.C. Campos, A.A Fonseca & J.M.G. Oliveira “Effect of building and rough ground on airport noise”. 17th ASC-CEAS/X-NOISE EV Workshop, Seville, 2013.
17. L.M.B.C. Campos, J.M.G. Marques “On runway capacity and wave vortex safe separation distance” (SSD), 3rd Sesar Innovation Days, KTH. Stockholm, 2013.
18. J. M. G. S. Oliveira & P. J. S. Gil, “Sound propagation in lined Ducts with Circular and Elliptical Cross Section”, XX Conference on Acoustic and Biomedical Engineering, 15-19/4/2013, Zakopane, Polónia.
19. J. M. G. S. Oliveira, “Recent Research on Acoustics at IST Lisbon”, XX Conference on Acoustic and Biomedical Engineering, 15-19/4/2013, Zakopane, Polónia.
20. L. Piedade, V. Coelho, and J. M. G. Marques (2013) "Implementation of Apron Management at Lisbon Airport. Conceptual procedure using a variable geometry principle for runway 17/35", in Proceedings of the World Conference of Air Transport Research Society (ATRS 2013), Session 1-C: Airport Planning and Management I, Bergamo, Italy, June 26-29.
21. Miguel Marques, José Antunes, Vincent Debut, Coupled Modes and Time-Domain Simulations of a Twelve-String Guitar with a Movable Bridge In Proceedings of the SMAC 2013 Stockholm Music Acoustics Conference.

II. Research and Technology Projects

Projects as leader or partner

EU funded projects

- **2011-1014:**

X-NOISE EV (Aircraft Noise Network) – Phase IV, funded by the European Union, 7th Framework Programme, 3rd Call. Leader-SNECMA, France.

Industry Contract Research

- Research and technology project in “Aerothermal analysis and design of turbomachinery.”, sponsored by General Electric - Global Research, USA, 2012. Principal investigator: André Marta.

- "EGNOS Operational Test and Validation". Project financed by EUROCONTROL, NAV Portugal, and additionally having as partners Força Aérea Portuguesa, VINAIR, IDMEC. Agostinho Fonseca participated in the IDMEC contribution.
- "Implementation and operational evaluation of a GBAS system". Project co-financed by NAV Portugal. This is a national collaboration project, having as partners NAV Portugal, Força Aérea Portuguesa, VINAIR and IDMEC. Agostinho Fonseca participated in the IDMEC contribution.

Other projects

Members of CCTAE were involved in the following projects:

- "Electric Long Endurance UAV". (Project coordinator: André Marta). Budget: 26724 Euros. LAETA collaborative project including the groups CCTAE, IDMEC, AEROG and INEGI, in the research line of Aeronautics and Space. Portugal, 2011-2014.

Computational applications

- A. C. Marta: Multidisciplinary optimization framework for aero-acoustic design of wind turbine blades.
- A. C. Marta: High-fidelity RANS adjoint solver for turbomachinery blade design applications.
- A. C. Marta: Robust and reliability-based design optimization methods for multidisciplinary aircraft design.

New experimental installations

- Further development and application of a Research Flight Simulator.

III. Scientific Orientation

PhD Thesis

On-going PhD Thesis

- Aníbal da Luz Santos Mota. PhD in Aerospace Engineering, co-supervised by Fernando Lau.
- Daniel Neto Cabrita e Gil Saraiva. PhD in Aerospace Engineering, started in 2011, co-supervised by Agostinho Rui Alves da Fonseca and José Raúl Carreira Azinheira (IDMEC).

- Simão Santos Rodrigues. "Aero-thermal analysis and design of turbomachinery blades using multi-stage unsteady adjoint methods", PhD in Aerospace Engineering, supervised by André C. Marta

Master Thesis

Completed Master Thesis

1. Stochastic optimization in aircraft design, Luís Amândio, Aerospace Engineering, November 2013. Orientador: André Marta.
2. Design, construction and test of the propulsion system of a solar UAV. Héctor González, Aerospace Engineering, March 2013. Orientador: André Marta.
3. Implementação de um Programa de Flight Data Monitoring (FDM) na Frota Embraer 145 da PGA - Portugália Airlines , João Carlos Silva Grilo Batista Ribeiro, Engenharia Aeroespacial, Abril 2013. Orientador: Pedro Serrão.
4. Jorge André Fernandes Baginha, "Construção de uma Ferramenta Computacional para a Simulação Aerodinâmica de um conjunto Asa e Flap", Engenharia Aeroespacial, 20-12-2013. Co-Orientador: Fernando Lau.
5. João Filipe Caetano de Santana, "New Methodologies of Integrated Development in Aeronautical Structures - Implementation of Knowledge Management Strategy in CEIIA", Engenharia Aeroespacial, 17-12-2013. Orientador: Fernando Lau.
6. Ana Elisa Alves Vieira, "Helicopter Rotor Noise: Development of an Acoustic Software Tool", Engenharia Aeroespacial, 02-12-2013. Orientador: Fernando Lau.
7. Gonçalo Valente da Silva Leal, "Validation of a Tool for Subsonic Flutter Analysis of Straight Cantilever Wings", Engenharia Aeroespacial, 26-11-2013. Orientador: Fernando Lau.
8. Filipe Miguel Carrapato Sousa, "Topology Optimization of a Wing Structure: Studies on Morphing Compliant Edges", Engenharia Aeroespacial, 27-12-2013. Co-orientador: Fernando Lau.

IV. Other Activities

- L. M. B. C. Campos is a member of the editorial board of "International Journal of Aeroacoustics"
- A. C. Marta is reviewer of scientific papers submitted for publication at the International Gas Turbine Institute (IGTI) of the American Society Of Mechanical Engineers (ASME), 2008-2012.
- A. C. Marta is Principal investigator in a research and technology project in Uncertainty Quantification in Heat Transfer Turbomachinery Design, sponsored by General Electric - Global Research, USA, 2012.

Organisation of Conferences and Workshops

- A. C. Marta: Organizer of the Mini-Symposium "Optimization in Engineering", part of the ADMOS 2013 (ECCOMAS Thematic Conference) – 3rd International Conference on Adaptive Modeling and Simulation, Lisbon, Portugal, 3-5 June 2013.
- L. M. B. C. Campos: Chairman of session "Risk assessment II" in International Conferences on Air Transport, Ecole Nationale de L'Aviation Civile (ENAC), Toulouse.

V. Funding

Funding received in 2013:

FCT (base e programático)	36 379 Euro
General Electric - Global Research	56 319 Euro