

CCTAE

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

(Center for Aerospace Science and Technology)

**Summary of Activities
2008**

I. Publications

Chapters of Books

Gil, P. J. S., 2008. "Spiral curvilinear orthogonal coordinates in the context of astrodynamics", in *Advances in Mathematical Problems in Engineering, Aerospace, and Sciences*, ed. Seenith Sivasundaram, Cambridge Scientific Publishers, Cambridge, UK, pp. 29-39.

Papers in Journals

2008

1. L. M. B. C. Campos (2008) "On the generation, propagation and radiation of magneto-acoustic-gravity waves with application to stars", *Geophysical and Astrophysical Fluid Dynamics*, 102 (1), 51-74.
2. L.M.B.C. Campos & P. G. T. A. Serrão (2008) "On the acoustic matching of straight, curved and twisted tubes", *International Journal of Acoustics and Vibration*, Volume 13, pages 100-111.
3. L. M. B. C. Campos & M. H. Kobayashi (2008) "On the propagation of sound in a high-speed non-isothermal shear flow", *International Journal of Aeroacoustics*, Volume 8, pages 199-230.
4. O. Bertolami, F. Francisco, P. J. S. Gil, J. Páramos (2008), "Thermal Analysis of the Pioneer Anomaly: A Method to Estimate Radiative Momentum Transfer", *Phys. Rev. D* 78 (10), 103001, DOI: 10.1103/PhysRevD.78.103001, e-Print: arXiv:0807.0041.

Communications to International Symposia

2008

1. L. M. B. C. Campos, J. M. G. Marques "On alternative safety metrics for the probability of collision between aircraft", European Congress of Mathematics for Industry ECMI 2008 University College, London. June 2008.
2. L. M. B. C. Campos "On the trajectories of transatmospheric vehicles", European Congress of Mathematics for Industry ECMI 2008 University College, London. June 2008.
3. L. M. B. C. Campos, P.G.T.A. Serrão "On sound propagation and generation with non-uniform swirl", European Congress of Mathematics for Industry ECMI 2008 University College, London. June 2008.
4. L. M. B. C. Campos, J. M. G. Marques "On aircraft response and control during a wake encounter", European Congress of Mathematics for Industry ECMI 2008 University College, London. June 2008.

5. L. M. B. C. Campos, P. J. S. Gil (2008). "On the Trajectory of Rockets in the Atmosphere", Proceedings of the The European Consortium For Mathematics In Industry - ECMI 2008, June 30 - July 4, 2008, University College, London, UK.
6. F. Lau, J. Oliveira (2008), "Acoustics of Low Mach Number Nozzles with Area Expansions", Acoustics'08, Paris, 29 June - 4 July 2008. Euronoise Session: NS07/3 - Aeroacoustics.
7. L. M. B. C. Campos, P. J. S. Gil "On noise shielding by conical surfaces", NACRE 2nd Workshop an new aircraft concepts, Greenwich University. July 2008.
8. L. M. B. C. Campos, J. M. G. Marques "On cruise trim with minimum drag", NACRE 2nd Workshop an new aircraft concepts, Greenwich University. July 2008.
9. P. J. S. Gil, J. Schwartz (2008). "Quasi-Synchronous Orbits Around Phobos in the Context of a Phobos Sample Return Mission", AIAA/AAS Astrodynamics Specialist Conference and Exhibit 2008, 18 - 21 Aug, 2008, Honolulu, Hawaii, USA. AIAA-2008-6429.
10. F.J.P. Lau and A.A. Gomes. "Attenuation of the Flow Induced Vibration of a Plate by Topology Optimization of the Properties of the Supports", The Ninth International Conference on Computational Structures Technology & The Sixth International Conference on Engineering Computational Technology, 2-5 September 2008, Athens - Greece
11. B. Rocha, A. Fonseca, A. Suleman, "On the development of methods and techniques for aircraft Structural Health Monitoring", 26th Congress of the International Council of the Aeronautical Sciences, ICAS 2008, Anchorage, Alaska, USA, September 2008.
12. L. M. B. C. Campos, J. M. G. Marques "On the minimization of cruise dray due to pitch trim for flying-wing configuration", International Congress of Aeronautical Sciences ICAS 2008 Anchorage, Alaska. September 2008
13. L. M. B. C. Campos, J. M. G. S Oliveira "On the effects on noise of sound reflection and atmospheric absorption", International Congress of Aeronautical Sciences ICAS 2008 Anchorage, Alaska. September 2008.
14. L. M. B. C. Campos, J. M. G. Marques "On the probability of collision for climbing and descending trajectories relevant to air traffic management", International Congress of Aeronautical Sciences ICAS 2008 Anchorage. September 2008.
15. Fernando J. P. Lau, Alexandra A. Gomes "Topology Optimization for the Attenuation of Flow Induced Vibration of a Plate", 12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, 10-12 Sep 2008, Fairmont Empress Hotel and Victoria Conference Centre, Victoria, British Columbia, Canada.
16. L. M. B. C. Campos "On sound generation in axisymmetric sheared and swirling mean flow, 12th CEAS-ASC & 3rd X3-Noise workshop on "Turbomachinery broadband noise" Bilbao, Spain. October 2008.
17. Christophe, B., Foulon, B., Levy, A., Anderson, J. D., Sumner, T. J., Bertolami, O., Gil, P., Páramos, J., Progrebenko, S. V., Gurtvis, L., Reynaud, S., Courty, J.-M., Asmar, S. W., Métris, G., Bério, P., Bingham, R., Kent, B., Olsen, O., Andersen, P. H., Dittus, H., Lämmerzahl, K., Theil, S., Rievers, B., Bremer, S., 2008. "Gravity Advanced Package, an accelerometer package for Laplace or Tandem missions", Proceedings of the Annual meeting of the French Society of Astronomy and Astrophysics, Eds.: C. Charbonnel, F. Combes & R. Samadi. SF2A-2008, 103-106. <http://proc.sf2a.asso.fr>

Other Communications

2008

- P. J. S. Gil, P. M. B. Rosa (2008), "Modern Approaches in the Design of Complex Aerospace Systems", 4th International Workshop and Advanced School "Spaceflight Dynamics and Control", 8-10 October 2008, Covilhã, Portugal.

Reports

2008

1. Fonseca, A., "Networking of national research programmes in the European Research Area (ERA-NET) - Air Transport Net (AirTN) - Flight Mechanics and Integration: Past and present research projects with Portuguese involvement", Report AirTN-PT-001, AirTN-FP6-WP5, 2008.
2. Fonseca, A., "Networking of national research programmes in the European Research Area (ERA-NET) - Air Transport Net (AirTN) - Flight Mechanics and Integration: Proposals for future research topics", Report AirTN-PT-002, AirTN-FP6-WP5, 2008.
3. Fonseca, A., "Networking of national research programmes in the European Research Area (ERA-NET) - Air Transport Net (AirTN) - Flight Mechanics and Integration: Experts meeting, proposals of discussion topics", Report AirTN-PT-003, AirTN-FP6-WP5, 2008.
4. "WP5 - Bottom up R&T Activities Expert Meeting - Flight Mechanics, Systems and Integration", Networking of national research programmes in the European Research Area (ERA-NET) - Air Transport Net (AirTN), report of the experts meeting in Flight Mechanics, Systems and Integration, AirTN-FP6-WP5, CIRA, Capua, Italy, 2008.
5. Fonseca, A., Azinheira, J., "IST Lisbon: activity overview", 20th EGNOS Data Collection Network Workgroup Meeting: kick-off EDCN 2008/2009, <http://edcn.pilado.com>, Universidad Politecnica de Catalunya, Barcelona, Spain, October 2008.

A. Fonseca is also responsible for more than 1000 reports produced in Portugal in 2008 and related to EGNOS operational evaluation; (these reports are available in <ftp://chiado.dem.ist.utl.pt/pub/egnos-dc/EGNOS/reports/Y2008>).

II. Research and Technology Projects

EU funded projects

2005-2008

- NACRE (New Aircraft Concepts Research), funded by European Union, 6th Framework programme, 2nd call, Action Aeronautics, leader:Airbus; partners :see table 0; role: airframe noise shielding and cruise drag minimization.

2004-2009

- FRIENDCOPTER (Integration of Technologies in support of a passenger and environmentally friendly helicopter), funded by European Union, 6th Framework Programme, 1st call, Action Aeronautics; leader: Eurocopter; partners: see table 0; role of IST: model of helicopter noise and ground effects.

2007-2010

- X3-NOISE (Aircraft Noise Network) - Phase III, funded by the European Union, under the 6th Framework programme, 1st call, European Research Area/Aeronautics; leader-SNECMA-France; role of IST: Support task 5: Scientific exchanges.

Other projects

1. Lockheed P-3P Orion - Assessment of structural integrity; PoAF funding.
2. Socata Epsilon TB-30 - Assessment of structural integrity; PoAF funding.
3. Test and operational evaluation of the European Geostationary Navigation Overlay Service (EGNOS) as aeronautical satellite navigation system; international collaborative project coordinated and funded by EUROCONTROL; member of the EGNOS Data Collection Network (EDCN); responsible for EGNOS operational evaluation in Portugal; responsible for flight trials; co-responsible for tools and procedures development; responsible for the production of more than 1000 reports in 2008.
4. Development and implementation of a Research Flight Simulator.
5. Implementation and operational evaluation of a Ground Based Augmentation System (GBAS); collaborative project with NAV Portugal, PoAF and VINAIR.
6. Development of a PC-104 based instrumentation system; collaborative project with PoAF.
7. Development and application of algorithms for analyzing Electron Microscopy images; collaborative project with the Structural Electron Microscopy Team from the Institute of Cancer Research, United Kingdom.
8. Study of Bragg sensors for flight loads monitoring; collaborative project with IDMEC and PoAF.
9. Development of methods and techniques for Structural Health Monitoring (SHM); collaborative project with IDMEC.

New experimental installations

- Setup of a experimental GBAS ground station (Phase 1) in Lisbon Airport - project: Implementation and operational evaluation of a Ground Based Augmentation System (GBAS).

III. Scientific Orientation

Master Thesis

Completed Master Thesis

2008

1. Luís F. C. Vargas, "Wind Turbine Noise Prediction", Master Thesis in Aerospace Engineering, IST, Portugal, November 2008. Advisor: Fernando J. P. Lau, Co-advisor: João M. G. S. Oliveira.
2. Luís Miguel Alves de Brito Justino, "Systematic Procedure for Design and Certification of Structural Repairs" 2008. Advisor: Filipe S. R. P. Cunha
3. Marta Alberto Henriques, "UAV para Ajuda no Combate a Incêndios Florestais" 2008. Advisor: Filipe S. R. P. Cunha
4. Alice da Conceição Alpalhão de Sousa, "Metodologias de Ensaio e Análise Vibro-Acústica de Estruturas" 2008. Advisor: Filipe S. R. P. Cunha
5. Antonio Manuel Lourenço Farinha, "Módulo de Gestão de Equipamentos de Medida e Precisão do SIAGFA" 2008. Advisor: Filipe S. R. P. Cunha
6. Alves, J., Research Flight Simulator - Development and integration of the pilot interface module, Master Thesis in Aerospace Engineering, IST, Portugal, 2008. Advisor: Agostinho R. A. Fonseca, Co-advisor: José R. C. Azinheira.
7. Silva, H., Development of a low-cost instrumentation system, Master Thesis in Aerospace Engineering, IST, Portugal, 2008. Advisor: Agostinho R. A. Fonseca, Co-advisor: José R. C. Azinheira.
8. Coutinho, D., Control, system integration in a UAV, Master Thesis in Aerospace Engineering, IST, Portugal, 2008. Advisor: José R. C. Azinheira, Co-advisor: Agostinho R. A. Fonseca.
9. Van Doorselaere, V., Studies on phased-array actuators for aircraft Structural Health Monitoring systems, Master Thesis in Aerospace Engineering, IST, Portugal, 2008. Advisor: Agostinho R. A. Fonseca, Co-advisor: Afzal Suleman.
10. Jorge, J., Research Flight Simulator - Development and integration of the control and aircraft dynamics simulation module, Master Thesis in Aerospace Engineering, IST, Portugal, 2008. Advisor: José R. C. Azinheira, Co-advisor: Agostinho R. A. Fonseca.

11. Belard, N., On-line diagnosis and rule-based expert systems, Master Thesis in Aerospace Engineering, IST, Portugal, 2008. Advisor: Agostinho R. A. Fonseca.

IV. Other Activities

- A. Fonseca is member of AirTN expert group on Flight Mechanics, Systems and Integration. Portuguese FCT representative. 2007-2008.
- F. Lau was Evaluator of the 2nd FP7 call for proposals in the field of Aeronautics, at the European Commission.