

2016
FEUP Group Report
Paulo M S T de Castro

Contributors

- María Jesús Martínez Hermosilla ¹
- Paulo M.S.T. de Castro
- Sérgio João Monteiro de Barros Moreira
- Sérgio M.O. Tavares ²
- M. Tiago von Hafe Perez Ferreira da Silva
- Vasco Duarte Raposo

Courses

at Faculty of Engineering of the Universidade do Porto – FEUP:

P.M.S.T. de Castro

Design of Machine Elements I
Design of Machine Elements II
Fatigue and Fracture Mechanics

Sérgio M.O. Tavares

Design of Machine Elements I
Fatigue and Fracture Mechanics

at Instituto de Soldadura e Qualidade – ISQ:

Sérgio M.O. Tavares

Introduction to Fracture Mechanics, for Welding Engineering course / *Curso de Engenharia da Soldadura*, ISQ, (item 3-11), Grijó, Portugal ³

Awards

- P.M.S.T. de Castro
 - SPM – *Sociedade Portuguesa de Materiais* - Scientific achievement, awarded at PCF 2016, February 11, 2016.
 - FEUP *mérito pedagógico* - Pedagogical merit, awarded at FEUP on January 13, 2016 (*‘dia da FEUP’*).
- S.M.O. Tavares, P.M.S.T. de Castro
 - journal *Theoretical and Applied Fracture Mechanics*, Elsevier, ‘Highly Cited Paper’ award on Dec. 20, 2016 to:
 - Sérgio M.O. Tavares, Jorge F. dos Santos, Paulo M.S.T. de Castro, ‘Friction stir welded joints of Al–Li alloys for aeronautical applications: butt-joints and tailor welded blanks’, *Theoretical and Applied Fracture Mechanics*, vol. 65, 2013, pp.8-13.

Theses

FEUP Mech. Eng. Master theses:

¹ exchange student from Universidad Politécnica de Cartagena, Spain.

² invited auxiliary professor FEUP; also: FEUP post-doc. researcher since Oct. 2016.

³ with new teaching material: Sérgio Tavares, ‘Pós-Graduação em Engenharia da Soldadura; 3-11: Introdução à Mecânica da Fractura’, April 2016 (88 slides ppt).

- M. Tiago von Hafe Perez Ferreira da Silva
- María Jesús Martínez Hermosilla
- Sérgio João Monteiro de Barros Moreira

Papers

- D.F.C. Peixoto, P.M.S.T. de Castro, 'Mixed mode fatigue crack propagation in a railway wheel steel', *Procedia Structural Integrity*, vol.1, pp.150-157, 2016.
- D.F.C. Peixoto, P.M.S.T. de Castro, 'Modelling of the fracture of a railway wheel', *Procedia Structural Integrity*, vol.2, pp.1904-1911, 2016.
- D.F.O. Braga, T.Ramos, S. Eslami, P.J. Tavares, V. Infante, P.M.S.T. de Castro, P.M.G.P. Moreira, 'Train passenger car floor panel testing using digital image correlation and strain gauges and comparison with finite element modelling', *Engineering Failure Analysis*, vol.69, pp.108-121, 2016.
- M. Juergens, M. Tiago von Hafe Pérez Ferreira da Silva, S. Heimbs, H. Lang, E. Ladstaetter, E. Ombergsmeier, 'Pull-out testing of multiscale structured metallic z-reinforcements for CFRP laminates', *Composite Structures*, vol.161, pp.384–392, 2017⁴.
- M. Tiago von Hafe Pérez F. da Silva, P.P. Camanho, A.T. Marques, P.M.S.T. de Castro, '3D-reinforcement techniques for co-bonded CFRP/CFRP and CFRP/Metal joints: a brief review', *Ciência & Tecnologia dos Materiais*, ms. ref. no. CTMAT-D-15-00073, accepted July 8, 2016.
- S.M.O. Tavares, N. Viriato, M. Vaz, P.M.S.T. de Castro, 'Failure analysis of the rod of a hydraulic cylinder', *Procedia Structural Integrity*, vol.1, pp.173-180, 2016.
- S.M.O. Tavares, P.M.S.T. de Castro, 'A comparison of methodologies for fatigue analysis of shafts: DIN 743 vs. approaches based on Soderberg criterion', *Ciência & Tecnologia dos Materiais*, ms. ref. no. CTMAT-D-15-00065R1, accepted June 17, 2016.
- T.R. Lima, S.M.O. Tavares, P.M.S.T. de Castro, 'Residual stress field and distortions resulting from welding processes: numerical modelling using Sysweld', *Ciência & Tecnologia dos Materiais*, ms. ref. no.: CTMAT-D-15-00067R1, accepted Sept. 27, 2016.
- V. Infante, D.F.O. Braga, F. Duarte, P.M.G. Moreira, M. de Freitas, P.M.S.T. de Castro, 'Study of the fatigue behaviour of dissimilar aluminium joints produced by friction stir welding', *International Journal of Fatigue*, vol.82, pp.310-316, 2016.
- M.A. Farooq, H. Nóvoa, A. Araújo, S.M.O. Tavares, 'An innovative approach for planning and execution of pre-experimental runs for Design of Experiments', *European Research on Management and Business Economics*, vol.22, (3), 2016, pp.155-161.
- M.A. Farooq, H. Nóvoa, S.M.O. Tavares, A. Araújo; 'Uma nova abordagem à seleção de variáveis para o planeamento de experiências', *Revista TMQ – Techniques, Methodologies and Quality*, special issue Técnicas Avançadas da Qualidade, 2016.

Projects

- on-going, 'DalMat - Damage tolerant structures under mixed mode loading'; LAETA, coordinator S.M.O. Tavares; with UBI and IST.
- contribution to 'SciTech', INEGI, proposal preparation (only).
- closure of QREN 'CCB360', FEUP - SODECIA.
- contribution to 'BE' project proposal preparation (S.M.O. Tavares).

⁴ in the context of the master thesis of M. Tiago von Hafe Perez Ferreira da Silva at Airbus Group Innovations, Munich, Germany (initial contact at the company, for this thesis, promoted by Daniel F.O. Braga).

Presentations at conferences

XV Portuguese Conference on Fracture, PCF 2016, February 10-12, 2016, Paço de Arcos, Portugal

oral communications (no written paper)

- S.J. Moreira, S.M.O. Tavares, P.M.S.T. de Castro, 'Computational analysis of mode II and mode III specimens for fatigue crack growth'.

written communications

- Daniel F. C. Peixoto, Paulo M.S.T. de Castro, 'Mixed mode fatigue crack propagation in a railway wheel steel'.
- S.M.O. Tavares, N. Viriato, M. Vaz, P.M.S.T. de Castro, 'Failure analysis of the rod of a hydraulic cylinder'.

6th European Transport Research Conference: moving forward: Innovative Solutions for Tomorrow's Mobility, TRA, April 18-21, 2016, Warsaw, Poland

- A.A. Fernandes, P. Gomes, N. Couto, A. Pinto, P.M.S.T. de Castro, T. Soares, S.M.O. Tavares, 'Early phases of a novel cross car beam development', poster ID11082, TRA Marketplace Poster Session.

Mechanical Engineering Conference 2016 (CEM2016) promoted by LAETA; June 1-2, 2016, FEUP, Porto, Portugal

oral communications (no written paper)

- E. Aguiar, J. Pereira, L. Reis, S.M.O. Tavares, S.J. Moreira, P. Gamboa, P.M.S.T. de Castro, 'Structural integrity of morphing structures in magnesium alloys'.
- M. Hermosilla, S.M.O. Tavares, P.M.S.T. de Castro, 'Stress intensity factor calculation using conventional and extended finite element method'.
- S.M.O. Tavares, S.J. Moreira, P. Gamboa, L. Reis, E. Aguiar, J. Pereira, P.M.S.T. de Castro, 'Damage tolerant structures under mixed mode loading'.

poster

- S.M.O. Tavares, S.J. Moreira, M. Hermosilla, P.M.S.T. de Castro, 'Contribution to state of the art review on wing morphing and damage'.

21st European Conference on Fracture, ECF21, June 20-24, 2016, Catania, Italy

- D.F.C. Peixoto, P.M.S.T. de Castro, 'Modelling of the fracture of a railway wheel'.

8th International Conference on Bridge Maintenance, Safety and Management, IABMAS 2016; Foz do Iguaçu; Brazil; June 26-30, 2016

- J.A.F.O. Correia, S.M.O. Tavares, P.M.G.P. Moreira, P.J.S. Tavares, A.M.P. de Jesus, R.A.B. Calçada, 'Mixed-mode fatigue crack propagation rates of current structural steels applied for bridges and towers construction'. Published in 'Maintenance, Monitoring, Safety, Risk and Resilience of Bridges and Bridge Networks - Proceedings of the 8th International Conference on Bridge Maintenance, Safety and Management', IABMAS 2016, pp.2021-2027

6th EASN International Conference on Innovation in European Aeronautics, October 18-21, 2016, Porto, Portugal

- S.J. Moreira, S.M. O. Tavares, P.M.S.T. de Castro, 'Morphing structures and fatigue: the case of an UAV wing leading edge'.
- S.M.O. Tavares, P.M.S.T. de Castro, 'An overview of fatigue in aircraft structures'.

European Electric & Hybrid Vehicle Congress EEVC-2017 (<http://www.eevc.eu/>) March 14-16, 2017, Geneva, Switzerland

presentation submission

- P.C. Neves, J.-F. Vittori, P. Wilson, M. Huisman, P.M.S.T. de Castro, R. Natal, A.A. Fernandes, 'Fatigue design of thermoplastic matrix composites components – A simplified approach', abstract resulting of EU project ENLIGHT, submitted to European Electric & Hybrid Vehicle Congress EEVC-2017 (<http://www.eevc.eu/>) March 14-16, 2017, in the framework of the *Salon International de l'Automobile de Geneve* 2017.

Interventions

- Presentation: contribution to ‘Strategy FEUP2035’, at FEUP, February 4, 2016.

Evaluations

P.M.S.T. de Castro

- Evaluation of Applicants to Fulbright Grants for Students - Competition 2016.
- Monitoring and evaluation of EU project LOCOMACHS.
- *Comissão Científica para a Seleção de Candidaturas ERASMUS Mundus*, appointed by the Director of DEMec-FEUP Prof. J. Seabra on Feb. 22, 2016.
- Agenzia Nazionale per la Valutazione del sistema Universitario e della Ricerca ANVUR, Italy, evaluation of the Italian research system for the period 2011-2014 (VQR 2011-2014).
- South Africa’s National Research Foundation (NRF), evaluation of the quality of the research outputs and standing of a researcher. (July 8, 2016).

S.M.O. Tavares

- Evaluation of Individual Fellowships (IF) proposals of Marie Skłodowska-Curie Actions (Call H2020-MSCA-IF-2016), Research Executive Agency (REA) of European Commission. (evaluator of 12 proposals and *rapporteur* of 6 proposals).

Editorship

special issues

- *Fatigue and Fracture of Engineering Materials and Structures Virtual Issue (VI) ‘Fatigue and Fracture of Aerostructures’, on-line August 2016;*
- *Ciência e Tecnologia dos Materiais*, vol.27, (2), Julho-Dez. 2015; Pedro M. G. P. Moreira, Paulo J. S. Tavares, Paulo M. S. T. de Castro, editorial.
- *University POLITEHNICA of Bucharest Scientific Bulletin, Series D: Mechanical Engineering*, vol.78, (1), 2016; guest-editors: Paulo M.S.T. de Castro, Pedro M.G.P. Moreira.
- *Advances in Materials Science and Engineering*, special issue ‘Failure mechanisms and damage modelling for advanced materials’; to be published in 2017; lead guest-editor: Francesco Caputo (Seconda Università degli Studi di Napoli); co-guest editors: Carlos Navarro Pintado (Universidad de Sevilla) and P.M.S.T. de Castro (FEUP).

membership of editorial committees of proceedings

- P.M.S.T. de Castro, Transport Means 2014, Proceedings of the 18th International Conference, October 23–24, 2014, Kaunas University of Technology, Lithuania.
- P.M.S.T. de Castro, Transport Means 2015, Proceedings of the 19th International Scientific Conference, Dedicated to 25th anniversary of Klaipeda University, October 22–23, 2015, Kaunas University of Technology, Lithuania.

Refereeing

P.M.S.T. de Castro

- evaluation of a book proposal for Springer Science+Business Media, São Paulo, Brazil.
- *Aerospace Science and Technology*
- *Ciência & Tecnologia dos Materiais*, SPM
- *Composite Structures*
- *Fatigue and Fracture of Engineering Materials and Structures*
- *International Journal of Solids and Structures*
- *Journal of Materials in Civil Engineering*, ASCE
- *Journal of Materials Processing Technology*
- *Proceedings of the Institution of Mechanical Engineers, Part L: Journal of Materials: Design and Applications*

S.M.O. Tavares

- *Ciência & Tecnologia dos Materiais*, SPM
- *International Journal of Advanced Manufacturing Technology*
- *Metals — Open Access Metallurgy Journal*
- *Theoretical and Applied Fracture Mechanics*

Workshop and seminar organization

- Seminar by Jordi Vazquez, Optibelt Spain, 'Formação de Correias Optibelt', FEUP, March 3, 2016, in the frame of the JUNCOR-FEUP MoU (*protocolo de cooperação*) signed at FEUP on Dec. 14, 2015.
- Seminar on fracture mechanics by Professor Roberto Citarella, Università degli Studi di Salerno, Italy, at FEUP, Sept. 28, 2016.
- Seminar on residual stress by Dr. Raffaele Sepe, Seconda Università degli Studi di Napoli, Italy, at FEUP, Sept. 27, 2016.
- Workshop on fatigue of aeronautical materials & structures, chaired by Paulo M.S.T. de Castro, within the 6th EASN International Conference on Innovation in European Aeronautics Research, October 18-21, 2016, Porto, Portugal.

Membership of scientific committees of conferences

- P.M.S.T. de Castro - ECF21 – 21st European Conference on Fracture, Catania, Italy, June 20-24, 2016; member of International Advisory Board; chair of Minisymposium - Mixed mode fracture at different scales.
- P.M.S.T. de Castro, 1st International Conference on Materials Design and Applications 2016, FEUP, Porto, Portugal, June 30 – July 1, 2016; member of Scientific Committee.
- P.M.S.T. de Castro - Transport Means 2016: Sustainability: Research and Solutions, Juodkrante, Lithuania, October 5-7, 2016; member of the Scientific Editorial Committee.
- P.M.S.T. de Castro - 6th EASN International Conference on Innovation in European Aeronautics, Oct. 18-21, 2016, Porto, Portugal; member of International Scientific Committee; chair of Workshop on Fatigue of Aeronautical Materials & Structures.

Other

AIRBUS 'Fly Your Ideas' 2016 competition:

- Rui Sárria, Ana Nunes, Nelson Pinho, Daniel Amaral, Catarina Pereira, 'Innovative and environmentally friendly de-icing system integrated into CFRP fuselage', submitted to the 2016 AIRBUS 'Fly Your Ideas' competition. Academic advisors at FEUP: Paulo M.S.T. de Castro and Sérgio M.O. Tavares.

João Perre Carvalho de Brito Orelhas, MIEIG-FEUP, summer 2016 internship at Schmitt+Sohn Elevadores, Porto, Portugal, co-supervisor at FEUP: P.M.S.T. de Castro. Outcome:

- João Perre Carvalho de Brito Orelhas, 'Feasibility study on composites use in elevator door panels', July 2016 (57 pp).

Leonardo Filipe Marques Moreira, MIEM-FEUP, summer 2016 internship at EXSEPI, Anadia, Portugal; co-supervisor at FEUP: P.M.S.T. de Castro. Outcome:

- Leonardo Filipe Marques Moreira, 'Relatório de estágio, realizado de 18 de Julho a 29 de Agosto de 2016' (26 pp).

Service

Scientific societies

- P.M.S.T. de Castro, Sociedade Portuguesa de Materiais - SPM, coordinator of Fracture Division – service terminated by P.M.S.T. de Castro on July 17, 2016.

- P.M.S.T. de Castro, Nominated for election as Director of ICF ⁵.

Expert advice

- S.M.O. Tavares, Expert advice to Tribunal Judicial de Gouveia, Portugal, on fracture of a bolt of a heavy truck (ref. 18/15.9GTGRD).

Visitors to FEUP

academic visits

- Florianne le Fustec, student internship, Polytech' Lille, France, May-July 2016.
- Leon Michiels, student internship, Polytech' Lille, France, May-July 2016.
- Michael Juergens, Airbus Group Innovations, Munich, Germany ⁶, February 13-16, 2016.
- Raffaele Sepe, r&d visit, Dipartimento di Ingegneria Industriale e dell'Informazione, Seconda Università degli Studi di Napoli, Italy, Sept. 25-30, 2016.
- Roberto Citarella, visit in the frame of the ERASMUS+ academic staff exchanges, Dipartimento di Ingegneria Industriale, Università degli Studi di Salerno, Italy, Sept. 25-30, 2016.
- Younes Rachid, student internship, Polytech' Lille, France, May-July 2016.

others

- Eduardo Guimarães Marques, DUNBELT, Dec. 12, 2016
- Frederico Annes, LIDEL, Oct. 24, 2016
- Mário Lopes, DUNBELT, Dec. 12, 2016
- Nuno Rebelo, Aug. 5, 2016

Missions, attendance of meetings

P.M.S.T. de Castro

- Paço de Arcos, Portugal, PCF 2016, February 10-12, 2016.
- Lisbon, Portugal, Academia das Ciências de Lisboa, presentation by Afzal Suleman, April 21, 2016.
- Coventry, UK,
 - LOCOMACHS project evaluation, MTC-Manufacturing Technology Centre, June 14-16, 2016.
 - Advanced Aerostructure Forum 2016, Advanced Manufacturing Training Centre, Ansty Park, June 16, 2016.
- Warsaw, Poland, 6th European Transport Research Conference: moving forward: Innovative Solutions for Tomorrow's Mobility, TRA, April 18-21, 2016.
- Catania, Italy,
 - ECF21 – 21st European Conference on Fracture, June 20-24, 2016.
 - FFEMS Editorial Board Meeting, June 22, 2016, at the ECF21.
- Porto, Portugal, 1st International Conference on Materials Design and Applications 2016, FEUP, June 30 – July 1, 2016.
- Porto, Portugal, 'H2020 Framework, Impact for European Universities', FEUP, Dec. 16, 2016.

S.M.O. Tavares

- Paço de Arcos, Portugal, PCF 2016, February 10-12, 2016.
- Lisbon, Portugal, Academia das Ciências de Lisboa, presentation by Afzal Suleman, April 21, 2016.
- Lisbon, Portugal, 2nd HiLumi Industry Day, Workshop about High Luminosity LHC project (HL-LHC) at CERN, October 31, 2016.

S.J. Moreira

- Paço de Arcos, Portugal, PCF 2016, February 10-12, 2016.
- Lisbon, Portugal, Academia das Ciências de Lisboa, presentation by Afzal Suleman, April 21, 2016.

⁵ ICF, The Report from NomCo on: 'The Approval and Election by the ICF Council for the ICF ExCo Committee for 2017 to 2021.' (email of Prof. A.J. Kinloch of Dec. 29, 2016).

⁶ for the master examination of M. Tiago von Hafe Perez Ferreira da Silva.

Maria Hermosilla

- Lisbon, Portugal, Academia das Ciências de Lisboa, presentation by Afzal Suleman, April 21, 2016.

Vasco D. Raposo

- Geesthacht, Germany, Sept. 2016-February 2017, at HZG for preparation of master thesis under local supervision of Alessandro Barbini; co-supervisor at FEUP: P.M.S.T. de Castro.

M. Tiago von Hafe Perez Ferreira da Silva

- Munich, Germany, Sept. 2015-Feb. 2016, at Airbus Group Innovations for preparation of master thesis under local supervision of Michael Juergens⁷; co-supervisors at FEUP: P.M.S.T. de Castro and P.P. Camanho.

Juris

P.M.S.T. de Castro

Full Professor selection panel / *Professor catedrático, juri de concurso*

- Univ. Aveiro
- Univ. Coimbra

PhD, FEUP

- David Emanuel Pimentel Gonçalves
- João Carlos Rego Pereira
- Albertino José Castanho Arteiro

Master, MIEM/FEUP

- João Pedro Barbosa de Sousa
- Carlos José Gonçalves Ribas
- João Filipe
- João Pedro Monteiro Cabral de Noronha

Master, ISEP

- Ricardo Jorge Soares da Costa, Nov. 4, 2016

2017 (foreseen)

Laura Carballal, Schaeffler, seminar ‘formação sobre rolamentos’, at FEUP (date in the period March 20-24, 2017).

P.M.S.T. de Castro, plenary lecture at 6th International Conference on Fracture Fatigue and Wear FFW 2017, Porto, Portugal, 26-27 July 2017 <http://www.ffw.ugent.be/>

P.M.S.T. de Castro, Scientific Committee, 2º Congresso Doutoral de Engenharia / Doctoral Congress in Engineering – DCE 2017 <http://fe.up.pt/dce17> June 8-9, 2017

Marcelo F.S.F. de Moura, Paulo M.S.T. de Castro, preparation of 2017 visit to FEUP of Michele Perrella, University of Salerno, Italy.

⁷ initial contact at the company, for this thesis, promoted by Daniel F.O. Braga.