



**18<sup>th</sup> International Conference on**

**Fracture and Damage Mechanics**

**16-18 September 2019**

**Rodos, Greece**

## **Final Programme**

Conference venue: Rodos Place Hotel



**Early Registration 17.00-18.00 on the 15<sup>th</sup> September  
(beat the queue and register early!)**

# Instructions for Speakers

## Speakers Guidelines

Each session will be allocated a Chairperson responsible for introducing the speaker, controlling the timing of the sessions and facilitating questions.

### Prior to the Conference

Please ensure that you check the conference program carefully to confirm your presentation day and time.

Ensure overhead projections / power point slides contain minimal information and are in print large enough to read from all parts of the room. Body text should be at least 26 points, in a clear font with a background, which contrasts with the print. Avoid highly patterned backgrounds or overcrowding of charts or photographs.

### Prior to your Presentation

10 minutes prior to your session commencing, we ask that you proceed to your allocated room to meet with your session Chairperson.

### Audio Visual Setup

There will be a PC and Beamer in each room with Microsoft Powerpoint and Adobe Acrobat Reader.

On the desktop Folders are created for each session (i.e. Session 1, ...Session 7 etc.). Please copy your file on to the appropriate folder on the desktop.

## During Your Presentation

Presentations **are limited to 20 minutes** (which allows for 5 minutes for questions and answers). If your presentation exceeds the time limit you will be asked to stop because this will disrupt scheduling and encroach on the next speakers time slot (please be considerate).

## Session Chairperson Guidelines

The Chairperson's role on the day is to:

- Meet each speaker in the room that you will be chairing 10 minutes prior to your session commencing.
- Introduce yourself to each speaker
- Keep a 'keen eye' on the agenda's timing and to keep the conference flowing and on schedule. **If a speaker is missing, please move on to the next paper.** In this case please allocate more time for questions.
- Thank each speaker at the conclusion of their speech.
- Invite questions to the speaker/s at the conclusion of their presentations (when time allows) and encourage discussion between audience and speaker/s. When necessary the Chairperson may exercise the 'Chairperson's prerogative' to ask questions.
- 'Field' questions in an orderly manner and repeat questions if necessary.
- Introduce yourself to each speaker.

## Monday 16<sup>th</sup> September

**8.00** Registration

**8.45** Opening Address and Welcome

**9.00** Keynote Lecture: Rupture of Dilatant Geological Interfaces, Rupture and Damage at Dilatant Geological Interface, A.P.S. Selvadurai

Chair: Alkiviadis S. Paipetis

### Session A1

**Chair: I Cerny**

**9.30** *The role of replicated service atmosphere on deformation and fracture behaviour of carburised AISI Type 316H steel (Invited paper), A.D. Warren, P. J. Heard, P.E.J. Flewitt and T. L. Martin*

**9.50** *Comprehensive Numerical Simulation on Thermally Grown Oxide and Internal Stress Evolutions in Thermal Barrier Coatings , Ryuta Nakajima, Hiroaki Katori, Masayuki Arai and Kiyohiro Ito*

**10.10** *Crack Initiation Mechanism of Hydrogen Induced Cracking in Nickel, Noriyuki Takano, Hiroki Yamamoto*

### Session B1

**Chair: Z Sharif Khodaei**

**9.30** *Numerical and experimental investigation on the energy absorption capability of a full-scale composite fuselage section, D. Perfetto, G. Lamanna, M. Manzo, A. Chiariello, F. Di Caprio, L. Di Palma*

**9.50** *Optimum design of damage resistant reinforced composite panels, Andrea Sellitto*

**10.10** *Optimization methodology for continuous heterogeneous structures: a preliminary design of an engine mounting bracket, G.A. Campo, A. Vettorello, M. Giacalone*

**10.30**

**Coffee Break**

### Session A2

**Chair: P Flewitt**

**10.50** *Production and characterization of boride coatings on steels, Production and characterization of boride coatings on steels K.G. Anthymidis, A. Trakali and D.N. Tsipas*

**11.10** *A STUDY ON THE INFLUENCE OF LASER PARAMETERS ON LASER-ASSISTED MACHINING OF AISI H-13 STEEL, E. Kaselouris, A. Baroutsos, T. Papadoulis, N.A. Papadogiannis, M. Tatarakis, and V. Dimitriou*

**11.30** *Evaluation of residual stresses in laser welded high-pressure vessels steels by X-ray diffraction, Jiří Čapek, Nikolaj Ganev*

**11.50** *Effects of Temperature on the Fibre Matrix Interfacial Shear Strength of Carbon Nanotube Grafted Carbon Fibre Reinforced Heat Resistant Resin, Kazuto TANAKA, Daiki KUGIMOTO and Tsutao KATAYAMA*

**12.10** *Evaluation of self weight deflection*

### Session B2

**Chair: A Saimoto**

**10.50** *Numerical studies of the correlation between inclusion shape and effective elastic properties of the particle reinforced composites, Romana Piat, Pascal A. Happ*

**11.10** *A Finite Element numerical methodology for the fatigue analysis of cylinder liners of a high performance internal combustion engine, Saverio Giulio Barbieri, Valerio Mangeruga, Matteo Giacomini, Carlo Laurino, Mariano Lorenzini*

**11.30** *Computational multi-scale modelling of fiber-reinforced composite materials, Tsivolas Eleftherios, Leonidas N. Gergidis,, Alkiviadis S. Paipetis*

**11.50** *Virtual Element Method: micro-mechanics applications, Marco Lo Cascio, Alberto Milazzo, Ivano Benedetti*

**12.10** *Strain Energy Decomposition Influence in*

property of GFRTPL laminate at moulding temperature and formability simulation of diaphragm forming, Kazuto TANAKA, Toshihide KIYAMA, Tsutao KATAYAMA	the Phase-Field Crack Modelling at the Microstructural Level of Heterogeneous Materials, Karlo Seleš, Zdenko Tonković, Ante Jurčević, Jurica Sorić
<b>12.30 Lunch</b>	
<b>Session A3</b> <i>Chair: Zdeněk Majer</i>	<b>Session B3</b> <i>Chair: Z Tonkovic</i>
<p><b>14.00</b> Probability Ellipse method for damage detection in a composite winglet, G. Petrone, A. De Fenza, D. Perfetto, A. De Luca, A. Sorrentino and F. Caputo</p> <p><b>14.20</b> SHM of Composite Mono-Stringer Elements Based on Guided Waves, D G Bekas, M Mora Mendias, Z Sharif Khodaei, Evangelos Karachalios, F. J. Chamorro Alonso, and M.H. Aliabadi</p> <p><b>14.40</b> Smart Bondline Monitoring of an Efficient Industrial Thermoplastic Aircraft Window Frame, D G Bekas1a, D. Saenz-Castillo, Z Sharif Khodaei F. J. Chamorro Alonso and M.H. Aliabadi</p> <p><b>15.00</b> Hierarchical Reinforcing Fibers for Energy Harvesting Applications- a strength study, George Karalis, Christos Mytafides, Anastasia Polymerou, Kyriaki Tsirka, Lazaros Tzounis, Leonidas Gergidis, Alkiviadis S. Paipetis</p> <p><b>15.20</b> Numerical modelling of plasticity induced crack closure with rough fracture surfaces, Aleš Materna, Hynek Lauschmann , Jan Ondráček</p> <p><b>15.40</b> Dynamic fracture analysis of plates loaded in tension and bending using the dual boundary element method, Jun Li, Zahra Sharif Khodaei, M. H. Aliabadi</p>	<p><b>14.00</b> Morphology Evolution of Strengthen Phase and Matrix Channel of Single Crystal Superalloy during Creep Rafting, Zixu Guo, Xiaoyu Qin, Dawei Huang, Xiaojun Yan</p> <p><b>14.20</b> Damage evaluation of TBC by rapid thermal cycling test based on a laser irradiation, Yusuke Hayashi, Kento Suzuki1, Masayuki Arai, Kiyohiro Ito, Tsuyoshi Higuchi, Yuka Suzuki, and Tatsuo Suidzu</p> <p><b>14.40</b> Fatigue crack propagation under mixed mode I and III in Polyoxymethylene homopolymer, O. Slávik, P. Hutař, A. Gosch, M. Berer, T. Vojtek, F. Arbeiter, G. Pinter, L. Náhlík</p> <p><b>15.00</b> Fracture surface of a Ti-6Al-4V specimen with EDM notches tested under quasi-static loading in methanol, Sergio Baragetti, Emanuele Borzini and Emanuele Vincenzo Arcieri</p> <p><b>15.20</b> Influence of Unsizing and Carbon Nanotube Grafting of Carbon Fibre on Fibre Matrix Interfacial Shear Strength of Carbon Fibre and Polyamide 6, Kazuto TANAKA, Kanako Yamada, Yoshitake Hinoue and Tsutao KATAYAMA</p> <p><b>15.40</b> Water effect on the deformation behavior of Nafion membrane, Isamu Rikua and Koji Mimura</p>
<b>16.00 Welcome Reception Drinks</b>	

## Tuesday 17<sup>th</sup> September

<p><b>Session A4:</b> <b>Chair: M. Goto</b></p> <p><b>9.00</b> High-temperature creep tests of a Zr1%Nb alloy at constant stress and constant load, Václav Sklenička, Květa Kuchařová, Marie Kvapilová, Luboš Kloc, Jiří Dvořák and Petr Král</p> <p><b>9.20</b> Evaluation of fatigue resistance of laser welded high pressure vessels steel P355 considering fracture mechanics approach, Ivo Černý and Jan Ke</p> <p><b>9.40</b> Crack Tip Strain Field Evolution During In-Situ Enamel/Dentine Crack Propagation, Enrico Salvati, Cyril Besnard, Robert A. Harper, Thomas Moxham, Richard Shelton, Gabriel Landini, Alexander M. Korsunsky</p> <p><b>10.00</b> Recovery of fracture toughness on self-healing epoxies using ternary nanomodified microcapsules: a parametric study, Maria Kosarli, Kyriaki Tsirka, Stella Chalari, Antigoni Palantza, Alkiviadis S. Paipetis</p> <p><b>10.20</b> Engineering Measurement Method of Behavior Characteristic Applying Laban Theory, Genj Hotta, Yoshifumi Ohbuchi, Hidetoshi Sakamoto</p>	<p><b>Session B4:</b> <b>Chair: Andrea Sellitto</b></p> <p><b>9.00</b> A model for low-cycle fatigue in microstructured materials, Francesco Parrinello, Vincenzo Gulizzi and Ivano Benedetti</p> <p><b>9.20</b> Analysis of 3-Dimensional Creased Cracks, Yohei Sonobe, Takuichiro Ino, Atsuhiko Koyama and Akihide Saimoto</p> <p><b>9.40</b> A microscale approach for modelling concrete fatigue damage-mechanisms, Antonio Caggiano, Diego Said Schicchi, Sha Yang, Stefan Harenberg, Viktoria Malarics-Pfaff, Matthias Pahn, Frank Dehn and Eddie Koenders</p> <p><b>10.00</b> Size Dependent Thermo-Piezoelectricity for In-Plane Cracks, Jan Sladek, Vladimir Sladek, Miroslav Repka and Choon-Lai Tan</p> <p><b>10.20</b> Investigation on damage mechanisms in both continuous and short fibre reinforced thermoplastic, Stéphane Gillet</p>
<p><b>10.40 Coffee Break</b></p>	
<p><b>Session A5</b> <b>Chair: Kazuto TANAKA</b></p> <p><b>11.00</b> An influence of cyclic loading on behaviour of a hysteretic interface, Roman Vodička</p> <p><b>11.20</b> The low cycle fatigue behavior of superalloy GH4169 in high temperature gas environment, Xin Ding, Dawei Huang, Xiaojun Yan</p> <p><b>11.40</b> Turbine blade distortion after heat treatment: preliminary experimental investigation and FEM analysis; F. De Bona, A. Lanzutti, G. Lucacci, Moro and J. Srnec Novak</p>	<p><b>Session B5</b> <b>Chair: A De Luca</b></p> <p><b>11.00</b> DIC measurement of the full strain field in a tiled laminate to determine local and global stiffness properties, Jordi UYTTERSROT, Wouter DE CORTE, Wim VAN PAEPEGEM</p> <p><b>11.20</b> Photoelastic analysis of the stressed state of a flat element with geometrical stress concentrators (cutout and cuts), Marina Tabanyukhova</p> <p><b>11.40</b> Prediction of indent size formed by a high velocity impingement of a spherical ball based on an expanding cavity model, Kiyohiro Ito and Masayuki Arai</p>

<p><b>12.00</b> MECHANICAL PROPERTIES AND FRACTURE SURFACE ANALYSIS OF VINYL ESTER RESINS REINFORCED WITH RECYCLED CARBON FIBRES, Giorgio Zattini, Laura Mazzocchetti, Tiziana Benelli, Emanuele Maccaferri, Gianluca Brancolini and Loris Giorgini</p> <p><b>12.20</b> On the crack quasi-static growth, Vitalijs Pavelko</p>	<p><b>12.00</b> An Approach for Predicting the Initiation of Ductile Fracture in Plane Strain Rolling, Elena Lyamina, Alexander Pirumov and Yeong-Maw Hwang</p> <p><b>12.20</b> Gun Bullet Collision and Penetration Behaviors for Protecting Board, Yoshifumi OHBUCHI, Toshihiko YAMAGUCHI, Hidetoshi SAKAMOTO</p>
<p><b>12.40</b> Lunch</p>	
<p><b>Session A6</b> <i>Chair: Masayuki Arai</i></p>	<p><b>Session B6</b> <i>Chair: I Benedetti</i></p>
<p><b>14.00</b> Effect of Resin Layer Thickness on Mode II Delamination Growth Property of CFRTP Laminates under Static Loadings, Kazuto TANAKA, Kosuke ISHIDA, Keisuke TAKEMOTO and Tsutao KATAYAMA</p> <p><b>14.20</b> Effect of Air Oxidation Treatment of CNT on Tensile Strength of CNT / Polyamide 6 Nanofibres and Their Dispersion, Kazuto TANAKA, Masaki KAMADA, Tsutao KATAYAMA</p> <p><b>14.40</b> A Comparison of the Fracture Behaviour of Various Concrete Grades under Mixed Mode I/II Loading, Petr Miarka, Robin Janssen, Stanislav Seitl and Wouter De Corte</p> <p><b>15.00</b> On the strength weakening effect of stiffening ribs in the design of machine components, Strozzi, A, Bertocchi, E and Mangeruga V</p> <p><b>15.20</b> Lifetime calculation of soil-loaded non-pressure polymer pipes, Jan Poduška, Pavel Hutař, Andreas Frank, Gerald Pinter, Luboš Náhlík</p> <p><b>15.40</b> Material model development of sandwich composite: numerical-experimental investigation of head dummy impacting at vehicle interior components, A. Vettorello, G.A. Campo</p>	<p><b>14.00</b> Study on generalization of Lefort's approach to critical crack length, Jana Horníková, Pavel Šandera, Stanislav Žák, Jaroslav Pokluda</p> <p><b>14.20</b> A Method for Calculating Stress Fields near Cavities for the Pyramidal Yield Criterion, Sergei Alexandrov</p> <p><b>14.40</b> PREDICTION of THE ceramic foam structure FAILURE using a DETAILED FE model, Oldřich Ševeček, Jiří Hanák, Zdeněk Majer, Daniel Drdlík, Zdeněk Chlup, and Michal Kotoul</p> <p><b>15.00</b> Two-dimensional Stress Analysis of An Innite Plate with Anisotropic Inclusions by BFM, Takuichiro Ino, Yohei Sonobe, Atsuhiko Koyama, and Akihide Saimoto</p> <p><b>15.20</b> Modelling the strength of cellulose nanofiber-filled rigid low-density PU foams, J. Andersons, M. Kirpluks and U. Cabulis</p> <p><b>15.40</b> Finite Element modelling of delamination onset in polymeric composite material, Andrea Ferrari, Sergio Fanelli, Matteo Parlamento</p>
<p><b>16.00</b> Coffee Break</p>	
<p><b>Session A7: Posters</b></p>	

Analysis of Maximal Operation Amplitudes of Piezoelectric Vibration Energy Harvesters, Zdeněk Majer, Oldřich Ševeček, Kateřina Štegnerová, Ondřej Rubeš, Pavel Tofel and Zdenek Hadas

Thermoelastic rolling contact problem of an FGM layered elastic solid, Y. Alinia , A. Aali, M. A. Guler

Hybrid equilibrium finite element formulation for cohesive crack propagation, Francesco Parrinello

Experimental free vibration of damaged RC beam models, R.Capozucca, E.Magagnini, M.V. Vecchietti

Utilization of Williams' power series for estimation of crack behaviour under mixed-mode loading, Lucie Malíková, Petr Miarka and Hana Šimonová

Study of the viscoelasticity of chopped aramid fiber reinforced rubber composite, Jianhong Gao, Xiaoxiang Yang

Ultrasonic damage detection of impacted long and short fibre composite specimens, Andrea Sellitto, Aniello Riccio, Angela Russo, Carmine Napolitano, Mauro Zarrelli, Michele Meo

Experimental investigation on the mechanical behaviour of natural fibre sandwich panels with Posidonia core, Andrea Sellitto, Vincenzo Iodice, Giuseppe Zampini, Mauro Zarrelli, Aniello Riccio, Raffaele Sansone, Antonio Caraviello

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## Wednesday 18<sup>th</sup> September

<p><b>Session A8:</b> <b>Chair: D Bekas</b></p> <p><b>9.00</b> Damage analysis of thermal barrier coatings subjected to a high velocity impingement of a spherical ball, Kiyohiro Ito, Fei Gao and Masayuki Arai</p> <p><b>9.20</b> Impact Detection on Composite Plates Based on Convolution Neural Network, I. Tabian, H. Fu and Z. Sharif Khodaei</p> <p><b>9.40</b> A Comparative Study of Impact Localisation in Composite Structures Using Neural Networks Under Environmental and Operational Variations, Aldyandra Hami Seno, M.H. Ferri Aliabadi</p> <p><b>10.00</b> Fibreglass reinforced polymer structure response under different impact scenarios, G. Lamanna, A. Greco, M. Manzo, E. Armentani, C. Opran</p> <p><b>10.20</b> Nanofillers' effects on fracture energy in composite aerospace structures, Andrea Sellitto, Aniello Riccio, Angela Russo, Antonio Garofano, Mauro Zarrelli</p>	<p><b>Session B8:</b> <b>Chair: Roman Vodička</b></p> <p><b>9.00</b> On the use of carbon nanotubes to develop durable structural electrodes for self-sensing applications, Sotirios Grammatikos, Morten Melby Dahl, Vegar Salin Brøndbo, Angela Daniela La Rosa</p> <p><b>9.20</b> Electromagnetic shielding for buildings using hybrid polymer composites: a life cycle assessment study, Angela Daniela La Rosa, Sotirios A. Grammatikos, Romeo C. Ciobanu and Cristina M. Schreiner</p> <p><b>9.40</b> Influence of Magnetite Dispersion on Tensile Properties of Magnetite/PLA Nanofiber Nonwoven Fabrics, Kazuto TANAKA, Yuta ISHII, Tsutao KATAYAMA</p> <p><b>10.00</b> 3D DIC based residual stress estimation in hydrostatically extruded austenitic steel, Tomasz Brynk, Agnieszka Krawczynska</p> <p><b>10.20</b> Damage of solid phase due to explosion effect using Uzawa's algorithm, Petr P. Prochazka</p>
<p><b>10.40</b> <i>Coffee Break</i></p>	
<p><b>Session A9:</b> <b>Chair: Alkiviadis S. Paipetis</b></p> <p><b>11.00</b> Fracture Toughness Evaluation of a Cracked Freestanding Au Thin Film by Applying a Finite element Analysis and Bulge Test, Hector A. Tinoco, Pavel Hutař, Benoit Merle, Mathias Göken, Tomas Kruml</p> <p><b>11.20</b> A COMBINED NUMERICAL AND EXPERIMENTAL APPROACH TO EVALUATE THE HARDNESS OF AA ALUMINUM 6063 T6 WITH A NiP COATING, Juan S. León B, A. Pertuz, M. Martínez</p> <p><b>11.40</b> Growth Rate of Small Surface-Cracks in Age Hardening Cu-Ni-Si Alloy under Cyclic Stressing, M. Goto, T. Yamamoto, J. Kitamura, S.Z. Han, R. Takanami, T. Yakushiji and J. Lee</p> <p><b>12.00</b> Evaluation of quasi-static and dynamic</p>	<p><b>Session B9</b> <b>Chair: Ferri Aliabadi</b></p> <p><b>11.00</b> Numerical Simulation of Volcanic Ash Infiltration into TBC, Masayuki Arai, Yuta Fukushima and Kiyohiro Ito</p> <p><b>11.20</b> ANALYSIS OF THE HEAT AFFECTED ZONE AND SURFACE ROUGHNESS DURING LASER MICROMACHINING OF METALS, E. Kaselouris<sup>1</sup>, a, A. Skoulakis, Y. Orphanos, K. Kosma, T. Papadoulis, I. Fitis, E. Clark, A.P. Markopoulos, M. Bakarezosi, N.A. Papadogiannis, M. Tatarakis, and V. Dimitriou</p> <p><b>11.40</b> TEM STUDY OF JUNCTIONS BETWEEN MARTENSITE PACKETS (LATH) AND CHANGES IN MICROSTRUCTURE OF LOW-CARBON CHROMIUM STEEL BEFORE LCF II, T. Eterashvili, M. Vardosanidze T. Dzigrashvi</p>



<p>fracture toughness on the low-alloy reactor pressure vessel steel JRQ in the transition region, P. Spätig, V. Mazánová, S. Suman and H.-P. Seifert</p> <p><b>12.20</b> The dominating role of carbon-enriched austenite with a filmy morphology for a combination of high strength and toughness in a low carbon steel, Xuejun JIN</p>	<p><b>12.00</b> TEM STUDY OF JUNCTIONS BETWEEN MARTENSITE PACKETS (LATH) AND CHANGES IN MICROSTRUCTURE OF LOW-CARBON CHROMIUM STEEL AFTER LCF III, T. Eterashvili, T. Dzigrashvili, M. Vardosanidze</p> <p><b>12.20</b> Stress Intensity Factor Sensitivities for Plate Bending Problems with the Dual Boundary Element Method, L Morse, Z Sharif Khodaei, M H Aliabadi</p>
<p><b>12.40</b></p>	<p><b>Lunch</b></p>
<p><b>End of the Conference</b></p>	