

MS2022

1ST INTERNATIONAL CONFERENCE ON MECHANICS OF SOLIDS

FEUP, Porto - Portugal

3-4 November 2022

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PROGRAMME

PROGRAMME OF MS 2022

Author underlined → presenting author

Thursday 3 November 2022

8:30 **MS 2022 Opening (Room B001)**

8:40 **Keynote lecture (Room B001)**

On the modeling of periodic and quasi-periodic viscoelastic metastructures (**MS22_56**)

MA Trindade (University of São Paulo, Brazil)

Session 1A – Elasticity, viscoelasticity and plasticity

(Chair: AM Ferreira and MA Trindade)

Session 1B – Mechanics of composite materials I

(L Feo and RD Adams)

Room B001

Room B002

9:00 Modelling constitutive behaviour of electroplastic effect in dual-phase steel (**MS22_88**)

J Tiwari (Indian Institute of Technology Madras, India), H Krishnaswamy, M Amirthalingam

Numerical study of seawater effect on mechanical strength in fiber-reinforced polymer composites (**MS22_104**)

H Vidinha (University of Coimbra, Portugal), R Branco, MA Neto, AM Amaro, P Reis

9:20 Damage analysis in a novel hole hemming process for joining magnesium and aluminum alloy sheets (**MS22_109**)

JAC Pereira, MM Kasaei (INEGI, Portugal), RJC Carbas, EAS Marques, LFM da Silva

Static analysis of FGM nano-size structures including surface effects based on stress-driven nonlocal theory of elasticity (**MS22_85**)

R Penna, G Lovisi, A Lambiase, L Feo (University of Salerno, Italy)

9:40 Micro-scale modeling of the ductile fracture of stainless steel foils (**MS22_110**)

M Karimi Firouzjaei, H Moslemi Naeini, MM Kasaei (INEGI, Portugal), MJ Mirnia, LFM da Silva

Asymptotic homogenization approach applied to periodic laminated Cosserat media with imperfect contact conditions (**MS22_58**)

V Yanes, R Rodriguez-Ramos (Universidad de La Habana, Cuba), Y Espinosa-Almeyda, CF Sánchez-Valdés, H Camacho-Montes, FJ Sabina

10:00 A systematic investigation on the role of step time increment in the implementation of physically based dislocation density model in differential form (**MS22_90**)

V Balaji (Indian Institute of Technology, Madras, India), H Krishnaswamy, S Natarajan

Continuum damage mechanics framework for modeling of CFRP composites (**MS22_64**)

S Rai (Indian Institute of Technology Delhi, India), BP Patel

10:20 Mechanical behavior and modelling of random strain-induced martensite formation in advanced medium-Mn automotive sheet steel (**MS22_96**)

A Grajcar (Silesian University of Technology, Poland), J Kaczmarczyk, A Kozłowska, JS Cruz Banuelos

An analytical and validated sandwich theory for soft and hard cores based on Timoshenko assumptions for the single layers (**MS22_70**)

J Schoeftner (Johannes Kepler University, Austria)

10:40-11:00 **COFFEE BREAK (Coffee Lounge)**

Session 2A – Mechanics of composite materials II

(Chair: CM Mota Soares and AM Ferreira)

Session 2B – Mechanical behaviour of materials I

(Chair: A Akhavan-Safar and RJC Carbas)

Room B001

Room B002

11:00 A multi-scale damage model based on SCA method for unidirectional CFRP laminate (**MS22_3**)

C Guo (Shanghai Jiao Tong University, China), S Jiang, J He

Optimised design and of a composite dielectric solar absorber using FEM method with multiscale approach (**MS22_77**)

M EL Hachemi (Luxembourg Institute of Science and Technology, Luxembourg), N Kahanna, E Barborini

11:20	Investigating cure shrinkage induced stress in thick composite beams by virtual manufacturing (MS22_6) <u>J Vroon</u> (Royal Netherlands Aerospace Centre (NLR), The Netherlands), N van Hoorn	Mechanical properties of ultra-high performance self-compacting mortar reinforced by recycled steel fibre (MS22_71) <u>H Abdolpour</u> (University of Science and Technology, Wroclaw, Poland), P Niewiadomski, Ł Sadowski, A Kwiecien
11:40	Solid tensegrity-inspired metamaterials with graded mechanical properties (MS22_16) <u>A Al Sabouni-Zawadzka</u> (Warsaw University of Technology, Poland), J Petczyński, W Gilewski	Ductile fracture of metallic materials based on Rousselier damage model: implicit implementation, calibration procedure and experimental validation (MS22_99) VAM Rodrigues, LLD Morales, <u>L Malcher</u> (University of Brasilia, Brazil)
12:00	A mechanical analysis of variable angle tow composite plates through variable kinematics models based on Carrera's unified formulation (MS22_17) <u>DA Iannotta</u> (Luxembourg Institute of Science and Technology, Luxembourg), G Giunta	Analysis of the mechanical performance of high-strength cementitious overlays modified with nanoparticles (MS22_59) <u>J Szymanowski</u> (Wroclaw University of Science and Technology, Poland)
12:20	Nonlinear mechanical behavior of anisotropic materials cosserat continuum (MS22_55) <u>E Shi</u> (Chongqing University, China), N Fantuzzi, Y Li, P Trovalusci, Z Wei	Towards the synergistic addition of granite powder and natural fibers in epoxy resin coatings (MS22_89) <u>Ł Kampa</u> (Wroclaw University of Science and Technology, Poland), Ł Sadowski
12:40	Static and free vibrations analyses of plate-shell panels made of fibre reinforced functionally graded material (MS22_57) <u>JS Moita</u> , AL Araujo, VF Correia, <u>CM Mota Soares</u> (University of Lisbon, Portugal)	Changes of the mechanical properties of PA12 when using TiO ₂ as antimicrobial additive (MS22_53) <u>P du Maire</u> (Esslingen University of Applied Sciences, Germany), A Oechsner
13:00-14:00	LUNCH BREAK (Coffee Lounge)	
	Session 3A – Fracture mechanics and Fatigue I (LFM da Silva and A Akhavan-Safar)	Session 3B – Vibration of discrete and continuous systems I (Chair: O Hrytsyna and RD Adams)
	Room B001	Room B002
14:00	A structured deformation driven nonlocal macro-meso-scale damage model (MS22_4) <u>Y Ren</u> (Tongji University, China), J Chen, G Lu, J Li	Torsional vibration of a nanotube with flexoelectric and micro-inertia effects (MS22_65) <u>O Hrytsyna</u> (Institute of Construction and Architecture Slovak Academy of Sciences, Slovakia), J Sladek, V Sladek, Q Deng, M Hrytsyna
14:20	Bridge cracks in piezoelectric materials (MS22_5) <u>EM Crăciun</u> ("Ovidius" University of Constanta, Romania), GMD Ghita	A harmonic balance method based on Green's functions for the vibration of solids with non-linear interfaces (MS22_67) <u>A Tsetas</u> (Delft University of Technology, The Netherlands), A Tsouvalas, AV Metrikine
14:40	Simplified breathing crack element for spectral Timoshenko beam model (MS22_30) <u>TJ Saravanan</u> (Indian Institute of Technology Bhubaneswar, India), G Mondal, S Rajasekharan	On the buckling and vibration of noncarbon nanotubes through atomistic continuum coupled multiscale computational framework (MS22_94) <u>S Singh</u> (Indian Institute of Technology Indore, India)
15:00	Numerical investigation of the crack growth of Inconel 718 under periodic loading (MS22_105) <u>M Movafagh</u> (Science and research Islamic Azad University, Tehran, Iran), SMR Khalili	Simulation of acoustic radiation of vibrating plates using transmission line matrix method (MS22_42) <u>A Alia</u> (University of Lille, France)

15:20	Two-scale modelling of fatigue crack initiation from macroscopic stress concentrations (MS22_54) D.Khan (Eindhoven University of Technology, The Netherlands), J Maljaars, D Leonetti, V Kouznetsova, MGD Geers	Void detection in adhesive joints through electromechanical impedance signatures (MS22_79) AFG Tenreiro (INEGI, Portugal), AM Lopes, LFM da Silva
15:40	Applications of M-integral for 3D anisotropic cracks with detailed solution steps (MS22_106) AM Asan (Firat University, Turkey), MO Kaman, S Dag, S Erdem, K Turan	Nonlinear free vibrations analysis of porous functionally-graded nano-beams in hygrothermal environment (MS22_84) R Penna, G Lovisi, A Lambiase, L Feo (University of Salerno, Italy)
16:00-16:20	COFFEE BREAK (Coffee Lounge)	
	Session 4A – Mechanical behaviour of materials II (Chair: EAS Marques and Ł Sadowski)	Session 4B – Fracture mechanics and Fatigue II (L Feo and LFM da Silva)
	Room B001	Room B002
16:20	Reinforced hybrid CFRP laminates using thin-ply (MS22_18) F Ramezani (INEGI, Portugal), RJC Carbas, EAS Marques, LFM da Silva	The enriched finite element method-virtual crack closure technique for cracked structures (MS22_78) L Zhou, J Wang (Jilin University, Changchun, PR China), Y Wang
16:40	Mechanical properties of adhesive joints with polybutylene terephthalate reinforced with glass fiber substrates and silicone adhesive after water aging (MS22_108) CSP Borges (INEGI, Portugal), A Akhavan-Safar, EAS Marques, RJC Carbas, C Ueffing, P Weissgraeber, LFM da Silva	Analysis of curved beams with an edge crack using a higher-order spectral element model (MS22_86) SS Ahamed, TJ Saravanan (Indian Institute of Technology Bhubaneswar, India), G Mondal, S Rajasekharan
17:00	Fracture prediction of ductile epoxy resins using a modified normal stress criterion: Effects of mode mixity and strain rate (MS22_24) J Bidadi, A Akhavan-Safar (INEGI, Portugal), H Saeidi Googarchin, LFM da Silva	Decoupling fracture modes in non-standard test specimens: state of the art (MS22_82) P Tsokanas (University of Patras, Greece), A Akhavan-Safar, PS Valvo, T Loutas, LFM da Silva
17:20	Influence of waste quartz powders on the mechanical properties of epoxy coatings (MS22_101) A Chowaniec-Michalak (Wrocław University of Science and Technology, Poland)	J-integral consistent phase-field approach to fracture under compressive stresses (MS22_103) H Jafarzadeh (Interdisciplinary Centre for Advanced Materials Simulation (ICAMS), Germany), A Patton, M Negri, A Reali
17:40	The effect of carbon nanotubes on the mechanical properties of polyurethane paint coatings for softwood protection (MS22_102) K Brzozowska (Wrocław University of Science and Technology, Poland), A Chowaniec-Michalak, P Niewiadomski, Ł Sadowski	Simulation of concrete fracture under high loading rates using discrete elements (MS22_73) B Beckmann (Technische Universität Dresden, Germany), M Curbach
18:00	The effect of natural date palm tree fibers on the impact fatigue strength of adhesives (MS22_26) M Miri, A Akhavan-Safar (INEGI, Portugal), MR Ayatollahi, LFM da Silva	Energy-based meso-scale model for fracture simulation of cracked pipes under very low cycle fatigue loading (MS22_76) JH Hwang, YJ Kim (Korea University, Seoul, Korea), JW Kim
19:00	Poster session and RECEPTION (Coffee Lounge)	
	Elasticity, viscoelasticity and plasticity	
Poster 1	BEM model for ultrasonic wave propagation in three-temperature anisotropic viscoelastic porous structures (MS22_93)	MA Fahmy, MO Alsulami (Umm Al-Qura University, Saudi Arabia)
	Fracture mechanics and Fatigue	
Poster 2	Determination of mode I cohesive law of structural adhesives using the direct method (MS22_52)	BD Simões (INEGI, Portugal), PDP Nunes, EAS Marques, RJC Carbas, LFM da Silva

Poster 3	Direct generation of cohesive zone laws of adhesives (MS22_12)	DS Correia, ID Costa, EAS Marques (INEGI, Portugal), RJC Carbas, LFM da Silva
Poster 4	The effect of overloading on a ductile adhesive's mode I fatigue behaviour (MS22_20)	FC Sousa (University of Porto, Portugal), A Akhavan-Safar, LFM da Silva
Poster 5	The interaction of mode mixity and humidity on the S-N response of an epoxy adhesive (MS22_27)	FVB de Castro Lopes, A Akhavan-Safar (INEGI, Portugal), RJC Carbas, EAS Marques, R Goyal, J Jennings, LFM da Silva
Mechanical behaviour of materials		
Poster 6	Numerical and experimental study of thermal residual stresses on multimaterial adherends in single-lap joints (MS22_44)	BD Simões (INEGI, Portugal), RJC Carbas, EAS Marques, LFM da Silva
Poster 7	Dynamic analyses of crane subjected to the wind, moving load and earthquake (MS22_29)	L Solazzi (University of Brescia, Italy)
Poster 8	Mode I fatigue threshold energy assessment of different adhesives: Effects of temperature (MS22_28)	D Santos, A Akhavan-Safar (INEGI, Portugal), EAS Marques, RJC Carbas, LFM da Silva
Poster 9	Effect of partial replacement of cement with granite powder or quartz powder in cement mortars (MS22_75)	Z Woźniak (Wrocław University of Science and Technology, Poland), A Chajec, Ł Sadowski
Poster 10	Incorporation of boron nitride into alumina ceramic matrix (MS22_91)	PH Chibério (Universidade Federal do Rio Grande do Norte, Brazil), W Acchar, JMD Neto, HPA Alves
Poster 11	The mechanism of the adhesion and wettability of liquid and solid particles floating in the air to surfaces made of heterogeneous materials (MS22_100)	S Czarniecki (Wrocław University of Science and Technology, Poland), A Chowaniec-Michalak
Mechanics of composite materials		
Poster 12	Effect of fiber type on the translaminar fracture toughness of epoxy-based laminated composites (MS22_25)	H Taghibeigi, A Zeinedini, A Akhavan-Safar (INEGI, Portugal), LFM da Silva
Poster 13	The use of tough layers in composite adherend to improve the joint strength performance (MS22_13)	RJC Carbas (INEGI, Portugal), S Jalali, EAS Marques, LFM da Silva
Thermal and electrical effects in solids		
Poster 14	The phenomenon of spontaneous synchronization of electrically charged crystals in clouds (MS22_81)	A Wirowski (Lodz University of Technology, Poland), A Jarczewski
Poster 15	Phase field modeling of thermomigration at colder interface of solid state solder joints (MS22_83)	A Kunwar (Silesian University of Technology, Poland), U Subedi, YA Coutinho, J Hektor, S Liang, N Moelans
Vibration of discrete and continuous systems		
Poster 16	Nonlocal in time numerical model of composite beam deformation in motion (MS22_95)	ES Badina, RO Tsarev (Russian University of Transport, Moscow, Russia)

Session 5 – Optimum design methods

(Chair: AL Araujo and AM Lopes)

Room B001

- 9:00 The use of the bioinspired nodes with a variable centre of the rotation to optimize the normal stresses in a portal frame (**MS22_72**)
M Kopytowska (Lodz University of Technology, Poland), A Wirowski
- 9:20 Lamb waves propagation in SLJs with multiple levels of weak adhesion (**MS22_80**)
GMF Ramalho (University of Porto, Portugal), AM Lopes, LFM da Silva
- 9:40 Topology optimization of origami structures using smooth folds (**MS22_22**)
A Habibian, A Sohoul, A Suleman (University of Victoria, Canada)
- 10:00 Topology optimization of plane 2D structures with adaptive finite elements (**MS22_41**)
DMF Paraíso (University of Lisbon, Portugal), JM Guedes, HC Rodrigues
- 10:20 Investigation of geometries for increasing the energy density in electromechanical battery flywheels (**MS22_43**)
D Coppedé, C Frajuca (IFSP, São Paulo, Brazil), FS Bortoli, MA de Souza

10:40-11:00 **COFFEE BREAK (Coffee Lounge)****Session 6 – Mechanical behaviour of materials III**

(Chair: L Solazzi and CSP Borges)

Room B001

- 11:00 Mesomechanics of perforated auxetic planar structures by full-field measurements (**MS22_9**)
B Koochbor (Rowan University, USA), G Youssef, N Pagliocca, KZ Uddin
- 11:20 An investigation of environmental effects on the mechanical performance of hyperelastic adhesives joints (**MS22_11**)
PHE Fernandes (Fraunhofer IFAM, Germany), VC Beber, A Wulf, C Nagel
- 11:40 Experimental and numerical investigation into the hybrid joint performance considering microstructural roughness (**MS22_32**)
K Pang (Lancaster University, UK), XN Hou, XE Wang, JQ Ye
- 12:00 Comparative analyses of selected machine learning algorithms for prediction of green cementitious composites subsurface tensile strength (**MS22_33**)
S Czarniecki (Wroclaw University of Science and Technology, Poland), M Moj
- 12:20 Free-surface proximity induced mechanical bistability in precipitation systems (**MS22_97**)
RM Raghavendra (Indian Institute of Technology Kanpur, India), G Iyer, A Subramaniam
- 12:40 Dynamic buckling of sandwich panels (**MS22_38**)
AS Afonso, RB Santos, AL Araujo (University of Lisbon, Portugal)

13:00-14:00 **LUNCH BREAK (Coffee Lounge)****Session 7 – Thermal and electrical effects in solids**

(Chair: XF Yao and EAS Marques)

Room B001

- 14:00 The effects of microtemperature on double porous thermoelastic bodies (**MS22_10**)
OA Florea (Transilvania University of Brasov, Romania), AN Emin
- 14:20 Thermodynamically extended symplectic numerical simulation of viscoelastic, thermal expansion and heat conduction phenomena in solids (**MS22_37**)
T Fülöp, R Kovács, Á Pozsár, M Szücs, DM Takács (Budapest Univ of Techn and Econ, Hungary)
- 14:40 The use of Bragg fiber gratings for monitoring of thermal strain in additively manufactured continuous carbon fiber reinforced PLA (**MS22_69**)
A Orłowska-Galezia (Polish Academy of Sciences, Poland), C Graczykowski, P Pawłowski, M Mieloszyk, K Majewska, A Andrearczyk, R Rimasauskiene, M Rimasauskas

15:00	Investigation of flexoelectric effect on the functionally graded micro/nano plates by Moving Finite Element Method (MS22_50) <u>L Sator</u> (Slovak Academy of Sciences, Slovakia), V Sladek, J Sladek
15:20	Thermal-mechanical coupling dynamic analysis and optimization of drilling in composite repair (MS22_51) <u>XF Yao</u> (Tsinghua University, PR China), LB Zhang, Y Kan, X Fan, SY Xuan
15:40	A nonlinear fractional BEM model for magneto-thermo-visco-elastic problems in temperature-dependent FGA anisotropic rotating granular structures (MS22_92) <u>MA Fahmy</u> (Umm Al-Qura University, Saudi Arabia)
16:00-16:20	COFFEE BREAK (Coffee Lounge)
	Session 8 – Vibration of discrete and continuous systems II (Chair: S Adali and AM Ferreira)
	Room B001
16:20	Study on longitudinal vibration characteristics of elevator time-varying traction system (MS22_48) <u>P Xu</u> (Jinan University, Guangzhou, China), J Sun, J Xue
16:40	Sensitivity method for structural model update and identification in finite elements using vibration measurements (MS22_19) <u>LF Barazzutti</u> (Federal University of Rio Grande do Sul, Brazil), HM Gomes, LRC Drehmer
17:00	Vibration characteristics of porous functionally graded material sandwich plates resting on the elastic foundation with geometric discontinuities (MS22_35) D Singh, <u>A Gupta</u> (Shiv Nadar University, India)
17:20	The mechanics of a tuning fork (MS22_107) <u>RD Adams</u> (University of Bristol, UK)
17:40	Variational formulation for double-walled carbon nanotubes undergoing nonlinear vibrations due to nonlinear van der Waals forces (MS22_49) <u>S Adali</u> (University of KwaZulu-Natal, South Africa)
20:00	MS 2022 BANQUET (Porto Caves Calém)