

VCMF2020

VIRTUAL CONFERENCE ON MECHANICAL FATIGUE

9-11 September 2020

– UTC Time (London, Lisbon) –

LIVE EVENT

PROGRAMME

Introduction to the Programme of the VCMF 2020

Dear Colleagues, Dear Friends,

It is with great pleasure that we welcome you to the first edition of the International Conference on Mechanical Fatigue (VCMF 2020).

Due to the covid-19 pandemic, it was not possible to organize the face-to-face event designated "20th International Colloquium on mechanical Fatigue of Metals (ICMFM)". Therefore, it was decided to postpone the 20th ICMFM Conference, which was initially planned for 9 to 11 September 2020 and shift it to the second half of 2021, where a new date will be established soon (more likely also September 2021). The location, namely the Wrocław City in Poland, as well as the Conference Venue will remain the same.

The first Virtual Conference on Mechanical Fatigue (VCMF 2020) is organised by the University of Porto (FEUP, Portugal), the Wrocław University of Science and Technology (Poland), University of Electronic Science and Technology of China (China), Siberian Federal University (Russia), and the ESIS/TC12 Technical Committee (European Structural Integrity Society – ESIS), to be held on 9-11 September 2020. This conference is intended to be a forum of discussion of new research concepts, equipment, technology, materials and structures and other scientific advances within the field of mechanical fatigue and fracture. It is expected contributions from engineers, metallurgists, material scientists, among others, allowing a very multidisciplinary discussion.

Contributions were accepted but not limited to the following topics: - Cyclic plasticity and internal structure; - Ultra-low, low-, high- and giga-cycle fatigue; - Mechanisms of fatigue damage; - Fatigue thresholds; - Short and long crack growth; - Fatigue life prediction; - Fatigue behaviour modelling and simulation; - Creep-fatigue interactions; - Probabilistic fatigue and fracture; - Failure analysis and case studies; - Fatigue life extension; - Damage evaluation and fatigue design; - Variable amplitude loading; - Thermal fatigue; - Multiaxial fatigue; - Fatigue in biomaterials; - High temperature fatigue; - Fatigue-corrosion; - Environmental assisted fatigue; - Influence of manufacturing processes on fatigue behaviour; - Structural integrity assessments accounting for fatigue; and, - Applications and design codes (e.g. pressure vessels, metallic bridges, wind towers, offshore structures, etc).

The first edition of the VCMF 2020 event, organized between 9th and 11st of September 2020, gathers more than 60 participants from more than 20 nationalities demonstrating the vitality of this new event. This book gathers the abstracts of the works presented in the conference.

The Organizing Committee of the VCMF 2020 deeply acknowledges all authors that contributed to the success of this event, with their exciting presentations. The members of the Advisory and Scientific Committees are also fully acknowledged for their support to the conference. Special thanks are also addressed to the Plenary Speakers, Chairmen of the Sessions for their dedication, knowledge and energy brought to this event. Sponsors are also fully acknowledged for their important contributions. Finally, a word of appreciation for the Organizing Committee members as well as students and other FEUP/INEGI/IC staff for their tireless support.

The chair of the Proceedings of the First Virtual Conference on Mechanical Fatigue - VCMF (Book of Abstracts),

José António FONSECA de Oliveira Correia

Sessions at a Glance

Day (Portuguese time)	Sessions		Session Chair(s)
Wednesday, September 9 th 2020 9h00 - 9h45	PS1 PS2 PS3 PS4	Plenary Sessions	<i>Alfonso Fernández-Canteli</i>
Wednesday, September 9 th 2020 14h30 - 15h15			<i>Shun-Peng Zhu</i>
Thursday, September 10 th 2020 9h00 - 9h45			<i>Abílio De Jesus</i>
Friday, September 11 st 2020 9h00 - 9h45			<i>Dariusz Rozumek</i>
Wednesday, September 9 th 2020 9h45 - 11h15		A1	<i>Sergio Blasón</i> <i>José Correia</i>
Wednesday, September 9 th 2020 11h30 - 13h00		A2	<i>Grzegorz Lesiuk</i> <i>HaoHui Xin</i>
Wednesday, September 9 th 2020 15h15 - 16h45		A3	<i>Dariusz Rozumek</i> <i>Elizaldo Santos</i>
Wednesday, September 9 th 2020 17h00 - 18h15		A4	<i>Ricardo Branco</i> <i>Peter Huffman</i>
Thursday, September 10 th 2020 9h45 - 11h15		B1	<i>Felipe Vannucchi</i> <i>Abílio De Jesus</i>
Thursday, September 10 th 2020 11h30 - 13h00		B2	<i>Wojciech Macek</i> <i>Miguel Calvente</i>
Thursday, September 10 th 2020 15h00 - 16h30		B3	<i>Pavlo Krot</i> <i>Carsten Strzalka</i>
Thursday, September 10 th 2020 16h45 - 18h00		B4	<i>Pasquale Grossi</i> <i>Federico Uriati</i>
Friday, September 11 st 2020 9h45 - 11h00		C1	<i>Shahrum Abdullah</i> <i>Alfonso Fernández-Canteli</i>
Friday, September 11 st 2020 11h15 - 12h45		C2	<i>Abílio De Jesus</i> <i>Shun-Peng Zhu</i>
Friday, September 11 st 2020 15h00 - 16h30		C3	<i>Zhongxiang Liu</i> <i>Grzegorz Lesiuk</i>

Wednesday, September 9th 2020	
8h45	IRAS 2019 Opening Session
9h00	Plenary Session 1/VCMF_065: <i>Fatigue behavior of 2.25Cr1Mo0.25V steel under strain-controlled and stress-controlled fatigue-creep interaction at elevated temperature, Xu Chen</i> , School of Chemical Engineering & Technology, Tianjin University, China Chair: Alfonso Fernández-Canteli (University of Oviedo, Spain)
9h45	Session A1 - Chairs: Sergio Blasón, Germany; José Correia, Portugal
9h45	Probabilistic fatigue life evaluation under combined notch and size effects (VCMF_001) <u>Ding Liao</u> , Shun-Peng Zhu, José Correia, Abílio De Jesus, Rui Calçada
10h00	Plasticity and damage characteristic of acoustic emission signals for S460 steel exposed to tensile load (VCMF_018) <u>L. Cheng</u> , H. Xin, R. M. Groves, M. Veljkovic
10h15	Foreign object damage tolerance and fatigue analysis of induction hardened S38C axles (VCMF_016) <u>Jie-Wei Gao</u> , Ming-Hua Yu, Ding Liao, Shun-Peng Zhu, Zhen-Yu Zhu, Jing Han
10h30	Safe Operation of Underground Mining Vehicles Based on Cyclic Fatigue Monitoring of Powertrains (VCMF_024) <u>P. Krot</u> , R. Zimroz, P. Sliwinski, N. Gomolla
10h45	Predicting the fatigue life of hydraulic unit under variable operating conditions (VCMF_031) <u>Evgeniia Georgievskaia</u>
11h00	Accelerated Fatigue Test Procedure for Leaf-Springs Applied to Semi-Trailers (VCMF_021) R.G.L. Schwanke, J. Boaretto, <u>F.V. de Camargo</u> , C. Fragassa, C.P. Bergmann
11h15	Break

11h30	Session A2 - Chairs: Grzegorz Lesiuk, Poland; HaoHui Xin, Netherlands
11h30	Energy models in fatigue crack growth rate description in terms of mean stress effect avoidance under mode I and mixed-mode (I+II, I+III) loading condition (VCMF_008) D. Rozumek, <u>G. Lesiuk</u> , M. Szata, J.A.F.O. Correia, A.M.P. De Jesus
11h45	Stochastic modeling of fatigue crack growth (VCMF_007) <u>Yi-Zhao Li</u> , Shun-Peng Zhu, Ding Liao
12h00	Mixed mode (I+II) fatigue crack growth in 42CrMo4 steel under different heat treatment conditions (VCMF_005) <u>M. Duda</u> , M. Smolnicki, G. Lesiuk, P. Kotowski, R. Mech, J.A.F.O. Correia, A.M.P. De Jesus
12h15	Experimental verification of the survivability model under mixed I+II mode fracture for steels of rolling rolls (VCMF_028) <u>S.V. Belodedenko</u> , V.I. Hanush, O.M. Hrechanyi
12h30	Determination of the fatigue limit and initial crack length by means of fracture mechanics (VCMF_064) <u>M. Madia</u> , <u>S. Blasón</u>
12h45	Application of data-driven methods to estimating fatigue crack propagation rates (VCMF_014) <u>Mohamed El Amine Ben Seghier</u> , Jafar Jafari-Asl, Jose A.F.O. Correia, Abílio De Jesus, Behrooz Keshtegar, and Nguyen-Thoi Trung
13h00	Break

14h30	Plenary Session 2/VMCF_017: <i>The influence of monotonic damage which precedes cyclic loading, Peter Huffman, Successful Failure Consulting Corp, USA</i> Chair: Shun-Peng Zhu (University of Electronic Science and Technology of China, China)
15h15	Session A3 - Chairs: Dariusz Rozumek, Poland; Elizaldo Santos, Brazil
15h15	TCD-based Probabilistic modelling of fatigue life distribution of notched components (VMCF_002) <u>Jin-Chao He, Shun-Peng Zhu, Ding Liao</u>
15h30	Experimental investigation of corrosion-fretting fatigue performance of steel wires (VMCF_004) <u>Z. Liu, T. Guo, J. Correia, A. De Jesus</u>
15h45	Statistical analysis of monotonic and cyclic experimental data of centenary bridge material (VMCF_009) <u>B. Pedrosa, J. Correia, C. Rebelo, M. Veljkovic</u>
16h00	Fatigue life prediction of rubber-sleeved stud shear connectors using finite element analysis (VMCF_027) <u>X. Xu</u>
16h15	Probabilistic modelling of uncertainties in fatigue reliability analysis of turbine bladed disks (VMCF_032) <u>Xiao-Peng Niu, Shun-Peng Zhu, Jin-Chao He</u>
16h30	Condition monitoring systems and vibration fatigue (VMCF_036) <u>Skvorcov Oleg</u>
16h45	Break

17h00	Session A4 - Chairs: Ricardo Branco, Portugal; Peter Huffman, USA
17h00	Multiple Linear Regression Parameters for Generating Fatigue-based Entropy Characteristics of Magnesium Alloy (VCMF_043) <u>M.A.Fauthan</u> , S. Abdullah, M.F.Abdullah, S.S.K. Singh, I.F.Mohamed
17h15	Very high cycle fatigue behavior of a compressor blade titanium alloy at elevated temperature (VCMF_044) Fulin Liu, Chao He, Yao Chen, Qingyuan Wang, <u>Yongjie Liu</u> , and Wentao Huang
17h30	Very high cycle fatigue failure mechanism of TC17 electron beam welding joint at elevated temperature (VCMF_049) Yongjie Liu, Yao Chen, Qingyuan Wang, <u>Fulin Liu</u> , Chao He, Hong Zhang
17h45	Modification Optimization-Based Fatigue Life Analysis and Improvement of EMU Gear (VCMF_048) <u>Yonghua Li</u> , Chi Zhang, Hao Yin, Yang Cao, Xiaoning Bai
18h00	Experimental identification of viscoelastic properties of plates made of Quiet Aluminum (VCMF_037) <u>Pasquale Grosso</u> , Alessandro De Felice, Silvio Sorrentino

Thursday, September 10th 2020

9h00	Plenary Session 1/VCMF_010: <i>A comprehensive phenomenological methodology for descriptive and predictive probabilistic analysis of fatigue phenomena as cumulative damage processes, Alfonso Fernández-Canteli</i> , University of Oviedo, Spain Chair: Abílio De jesus (University of Porto, Portugal)
9h45	Session B1 - Chairs: Felipe Vannucchi, Brazil; Abílio De Jesus, Portugal
9h45	Numerical and Experimental Investigation on Hysteretic Performance of Composite Girder with Corrugated Web (VCMF_015) J. He, S. Wang, Y. Liu, <u>H. Xin</u> , G. Vasdravellis, J.A.F.O. Correia
10h00	Local Behavior of a Pultruded GFRP Bridge Deck under Fatigue Load (VCMF_034) Yun Sun, Haohui Xin, <u>Yuqing Liu</u>
10h15	Probabilistic Fatigue Analysis of CFRP reinforced small-scale metallic plates (VCMF_056) <u>A. Mohabedding</u> , J.A.F.O. Correia, P.A. Montenegro, HaoHui Xin, J.M. Castro
10h30	Local reinforcing effects of studs with high strength concrete (VCMF_035) <u>LIU Rong</u> , ZHAO Hao, XIN Haohui, LIU Yuqing
10h45	Biaxial stress concentration of pultruded GFRP perforated plate (VCMF_012) Z.H. Xiong, <u>Y.Q. Liu</u> , Y. Meng, C.Y. Zhao
11h00	A study of the fatigue failure mechanism in steel and composite rebars (VCMF_047) <u>G. Lesiuk</u> , W. Błażejewski, K. Czechowski, B. Babiarczuk, W. Macek, A. Zięty, K. Junik
11h15	Break

11h30	Session B2 - Chairs: Wojciech Macek, Poland; Miguel Calvente, Spain
11h30	FE modelling the fatigue behaviour of L-PBF Inconel 718 with as-built surfaces (VCMF_029) <u>F.Uriati</u> , G. Nicoletto, R. Konečná
11h45	Finite Element Analysis of Distortions and Residual Stresses in Metallic Laser Powder Bed Fusion (VCMF_051) <u>J. Gil</u> , F. Fiorentin, J.C.R. Pereira, A.M.P. de Jesus
12h00	Effect of build orientation on fatigue performance of additively produced structural components: a numerical methodology (VCMF_050) F. Fiorentin, B. Oliveira, J.C.R. Pereira, <u>J. Gil</u> , J.A.F.O. Correia, A.M.P. de Jesus, F. Berto
12h15	Fatigue behaviour of maraging steel produced by additive manufacturing (VCMF_052) F. Fiorentin, J. Melo, J. Prata, J.C.R. Pereira, M. Figueiredo, <u>A.M.P. de Jesus</u>
12h30	Metal Additive Manufacturing of End-Use Components and Parts: A Practical Overview (VCMF_022) <u>Milan Sljivic</u> , Stefan Wagner, Ana Pavlovic, Dragan Marinkovic
12h45	Three-dimensional fractography for conventional and additive manufactured steels after bending-torsion fatigue (VCMF_020) <u>W. Macek</u> , R. Branco, J. Trembacz, J.D. Costa, J.A.M. Ferreira, C. Capela
13h00	Break

15h00	Session B3 - Chairs: Pavlo Krot, Poland; Carsten Strzalka, Germany
15h00	<p>Prediction of crack initiation life in high-strength steel components fabricated by additive manufacturing (VCMF_013)</p> <p><u>R. Branco</u>, J.D. Costa, F. Berto, J.A. Martins Ferreira, C. Capela, W. Macek</p>
15h15	<p>The effect of hydrogen on the fatigue properties of high grade pipeline steel (VCMF_011)</p> <p>LI Yan-hua, FENG Hui, <u>CHI Qiang</u>, XU Xiao-feng</p>
15h30	<p>Reliability Analysis of Gas Pipeline with Corrosion Defect Based on Finite Element Method (VCMF_030)</p> <p>Yuan-Jian Yang, <u>Gui-Hua Wang</u>, Qiu-Yang Zhong, Huan-Zhang , Jun-Jie He, Hai-Jun Chen</p>
15h45	<p>Fatigue reliability estimation framework for turbine rotor using multi-agent collaborative modeling (VCMF_038)</p> <p>Xue-Qin Li, Guang-Chen Bai, <u>Lu-Kai Song</u></p>
16h00	<p>Acoustic Emission Characteristics for Determining Fatigue Damage Behaviour (VCMF_042)</p> <p><u>N. Md Nor</u>, S.N. Mat Saliah, S. Abdullah, S.S.K. Singh, N.A. Yahya</p>
16h15	<p>Constructal Design applied to biaxial elasto-plastic buckling analysis of square steel plates with cutout (VCMF_033)</p> <p><u>T. da Silveira</u>, J. P. S. Neufeld, L. A. O. Rocha, E. D. dos Santos, L. A. Isoldi</p>
16h30	Break

16h45	Session B4 - Chairs: Pasquale Grosso, Italy; Federico Uriati, Italy
16h45	Fatigue Behavior of Cold-Formed Z-Rails for Rack Structures (VCMF_053) <u>C.D.S. Souto</u> , V.M.G. Gomes, M. Figueiredo, J.A.F.O. Correia, G. Lesiuk, A.A. Fernandes, A.M.P. De Jesus
17h00	Fatigue assessment of metallic detail with statistical analysis of material data (VCMF_006) <u>B. Pedrosa</u> , J. Correia, C. Rebelo, M. Veljkovic
17h15	Global-Local Fatigue Life Assessment based on Hot Spot Stress and Elastoplastic Local Strains Methodologies: Comparative Study (VCMF_057) <u>C. Viana</u> , H. Carvalho, G. Lesiuk, A.M.P De Jesus, J.A.F.O. Correia
17h30	Mode superposition techniques for a priori high stress detection and fatigue hotspot identification (VCMF_003) <u>C. Strzalka</u> , M. Zehn, D. Marinkovic
17h45	Experimental Study of the Rolling Friction Coefficient in Highly Loaded Supports of Rotary Kilns (VCMF_025) I. Kuzio, V. Gursky, <u>P. Krot</u> , R. Zimroz, T. Sorokina

Friday, September 11st 2020

9h00	Plenary Session 1/VCMF_066: <i>Analysis of fatigue crack closure with three-dimensional yield-strip model, Andrei Kotousov</i> , The University of Adelaide, Adelaide, Australia Chair: Dariusz Rozumek (Opole University of Technology, Poland)
9h45	Session C1 - Chairs: Shahrum Abdullah, Malaysia; Alfonso Fernández-Canteli, Spain
9h45	Probabilistic analysis applied to multiaxial fatigue criteria for the S355 steel (VCMF_054) <u>R. Dantas</u> , J. Correia, S. Jovašević, G. Lesiuk, S.-P. Zhu, C. Rebelo, A. de Jesus
10h00	Probabilistic strain-life properties obtained by Linear regression analysis and distribution functions (VCMF_063) <u>A. Mourão</u> , J.A.F.O. Correia, P. Huffman, A. Jesus, T. Bittencourt, R. Calçada
10h15	Fatigue damage assessment based on local stress and strain approaches applied to Hercílio Luz steel bridge (VCMF_062) <u>A. Mourão</u> , <u>R. Cabral</u> , J.A.F.O. Correia, Z. Liu, D. Ribeiro, H. Carvalho, T. Bittencourt, R. Calçada
10h30	Predicted distribution in measured fatigue life from expected distribution in cyclic stress-strain properties using a strain energy based damage model (VCMF_059) <u>P.J. Huffman</u> , J.A.F.O. Correia, A. Mourão, T. Bittencourt, R. Calçada
10h45	The effect of the amount of fatigue samples on the estimation of p-S-N fields applied to metallic structural details (VCMF_069) <u>Joelton Barbosa</u> , José A.F.O. Correia, M. Calvente, R. Freire Júnior
11h00	Break

11h15	Session C2 - Chairs: Abílio De Jesus, Portugal; Shun-Peng Zhu, China
11h15	Stress Concentration Factor Evaluation for Tubular KT-Joints (VCMF_060) <u>Ali Aidibi</u> , José A.F.O. Correia, Nicholas Fantuzzi
11h30	Evaluation of the stress concentration factor for a welded KT-joint (VCMF_058) <u>B. Ávila</u> , H. Carvalho, P. Mendes, A. Aidibi, N. Fantuzzi, J. Correia
11h45	A comparative study on fatigue lifetime assessment based on stress and strain local criteria applied to an offshore structure (VCMF_061) <u>P. Mendes</u> , A. Mourão, A. Aidibi, N. Fantuzzi, J.A.F.O. Correia
12h00	Causes of cable fracture failure in high temperature and high pressure deep well and the way to avoid it (VCMF_045) Cao Yinping, Li Guoliang, Zhang Wenzhe, <u>Dou Yihua</u>
12h15	Failure Mechanism Analyses and Remedy Methods for Multi-packers Tubular Strings in Complex Wells (VCMF_046) Dou Yihua, Liu Hongtao, Liu Huifeng, Wan Zhiguo, <u>Cao Yinping</u>
12h30	Crack closure effects on fatigue crack propagation under constant amplitude loading for the 6061-T651 aluminium (VCMF_055) <u>Victor H. Ribeiro</u> , José A.F.O. Correia, Grzegorz Lesiuk, Aparecido C. Gonçalves
12h45	Break

15h00	Session C3 - Chairs: Zhongxiang Liu, USA; Grzegorz Lesiuk, Poland
15h00	Comparative study on the efficiency of reliability methods for the probabilistic analysis of local scour at bridge pier in clay sand mixed sediments (VCMF_019) Jafar Jafari-Asl, <u>Mohamed El Amine Ben Seghier</u> , Sima Ohadi, Jose A.F.O. Correia, and Nguyen-Thoi Trung
15h15	Optimisation of Wastes Compaction Parameters in Case of Gradual Wear of the Briquetting Press Rolls (VCMF_023) K. Baiul, S. Vashchenko, A. Khudyakov, <u>P. Krot</u> , N. Solodka
15h30	On stochastic method for scale-structural failure estimating and structure durability at safety operational loading (VCMF_026) <u>Eleonora Zavoychinskaya</u>
15h45	Numerical Study of FPSO Platform Brackets for Different Geometric Configurations Subjected to Environmental Loads (VCMF_039) K. L. Martins, V. T. Pinto, C. Fragassa, M. V. Real, L. A. O. Rocha, L. A. Isoldi, <u>E. D. dos Santos</u>
16h00	Durability Assessment of Multi-axial Strain Loads for Rural Road Condition in Time Domain (VCMF_040) <u>N.M. Hamzi</u> , S.S.K Singh, S. Abdullah, A.H. Azman, M.R.M. Rasani, L. Abdullah, N.M. Nor
16h15	Durability Assessment of Variable Amplitude Loading using Effective Strain Approach (VCMF_041) <u>A. A. A. Rahim</u> , C. H. Chin, S. Abdullah, S. S. K. Singh, N. Md Nor
16h30	Closing Session

GENERAL INSTRUCTIONS

. Basic requirements

Computer with camera and microphone.

The use of a cable connection instead of a wireless network connection is recommended.

When using a laptop, it should be plugged to electricity.

Test your micro and camera.

Make sure the image of your camera puts you in the centre of the image.

. Sessions

ZOOM MEETINGS LINK:

<https://videoconf-colibri.zoom.us/j/99589244757?pwd=dFpFRkY0L0pUWWZMaE1WUFhmQzBaUT09>

IF NECESSARY:

ID: 995 8924 4757

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The conference will be broadcasted in the YouTube channel:

https://www.youtube.com/channel/UCZU3qo3tzVPoNr-rQr_NJdw

ADDITIONAL INSTRUCTIONS FOR SPEAKERS

. Timing

45 minutes for the keynote lectures

15 minutes for the regular presentations

IMPORTANT: Chairs have to strictly control the time slot allocated to each presentation.

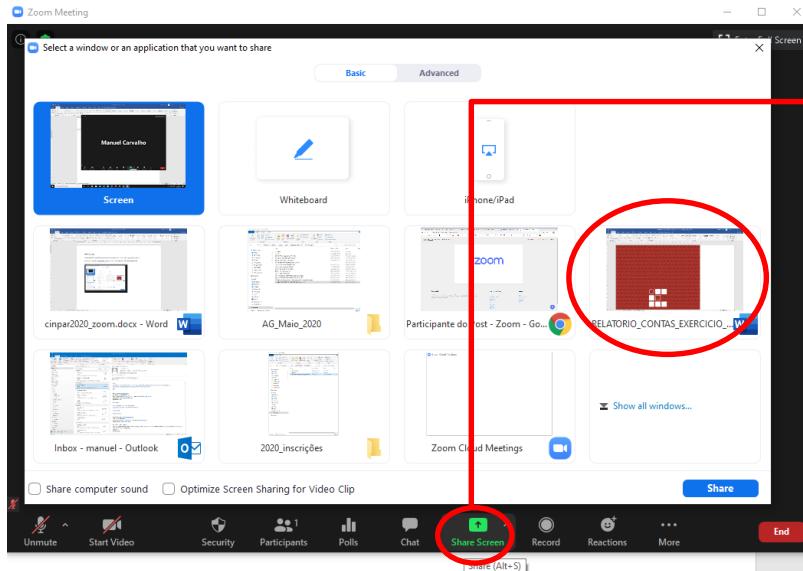
. PowerPoint

Oral presentations need to be made in English.

. Oral Presentation

In your session, you should open your PowerPoint presentation before the Chair invites you start the presentation.

After the introduction from the Chair, the speaker should start the presentation, sharing the screen with the corresponding PowerPoint file. This will allow all the audience to see the presentation in full-screen and a small box with the camera image of the speaker at the top-right corner of the screen.

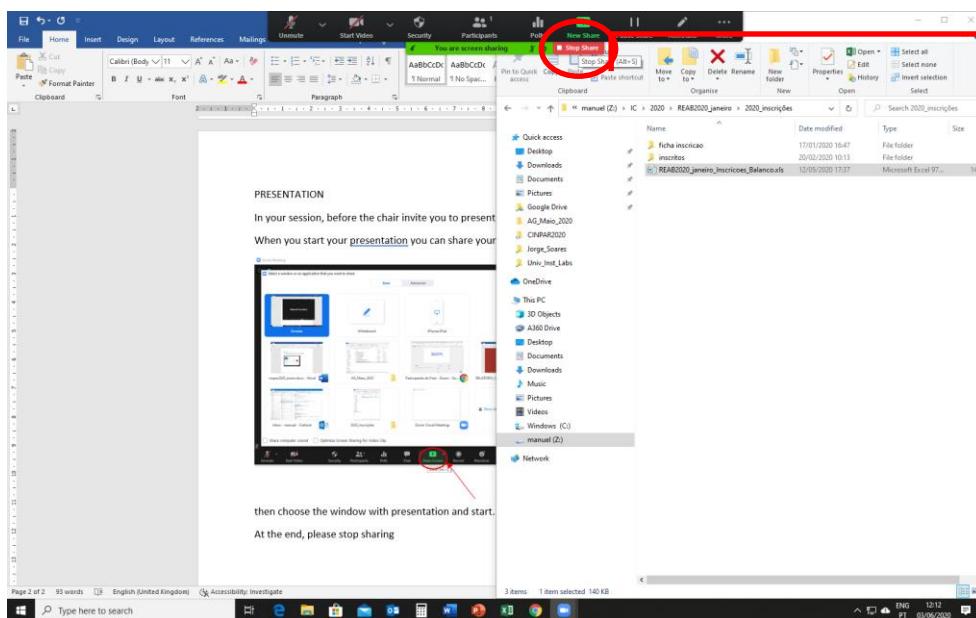


1st - SCREEN SHARING ICON

2nd - SHARE YOUR POWERPOINT

PRESENTATION (previously opened) and start

IMPORTANT: Right at the **end** of your presentation, please, **stop sharing** your screen and **mute** your **micro**.



STOP SHARING ICON (usually at the top of the monitor)

CONTACTS

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