



## Technical Program

### Wednesday, May 15

- 09:00 – 09:40**      **Opening of Workshop**  
09:00 – 09:20      Opening: Hatice Duran (TOBB-ETÜ) and Karl-Fredrik Nilsson (JRC)  
09:20 – 09:40      *The need for physics-based fracture and damage models for nuclear energy applications*  
K-F Nilsson, JRC-IET
- 09:40 – 11:00**      **Key Note Lectures (Session I)**  
09:40 – 10:20      *Simulation of Crack Extension by Cohesive Elements*  
W. Brocks, Christian Albrecht University, Germany  
10:20 – 11:00      *Nonequilibrium thermodynamics of surfaces and interfaces in solids with applications*  
T.O. Ogurtani, Middle East Technical University, Turkey
- 11:00 – 11:30**      **Coffee Break**
- 11:30 – 12:30**      **Oral Presentations (Session I)**  
11:30 – 11:50      *Towards development of hydrogen embrittlement resistant steel alloys*  
T.M. Hatem, British University in Egypt  
11:50 – 12:10      *A fracture criterion for the notch strength of high strength steels in the presence of H*  
C. Ayas, Cambridge University, UK  
12:10 – 12:30      *Overview of peridynamic theory: past and present*  
E. Oterkus, University of Strathclyde, UK
- 12:30- 14:00**      **Lunch**
- 14:00 – 15:20**      **Key Note Lectures (Session II)**  
14:00 – 14:40      *Comparison between pile-up singularities and stress fields induced by slip bands. Application to the prediction of grain boundary microcrack nucleation*  
Maxime Sauzay, CEA, France  
14:40 – 15:20      *Recent Advances in Phase Field Modeling of Brittle and Ductile Fracture*  
C. Miehe, University of Stuttgart, Germany
- 15:20 – 15:50**      **Coffee Break**
- 15:50 – 17:10**      **Oral Presentations (Session II)**  
15:50 – 16:10      *Crack thickness and volumetric work of fracture*  
K.Y. Volokh, Technion, Israel  
16:10 – 16:30      *Influence of hydrogen on dual phase steel deformation micro-mechanics*  
C.C. Tasan, Max-Planck-Institut für Eisenforschung, Germany  
16:30 – 16:50      *The scale transition procedure for constitutive equations in multilevel models based on crystal plasticity*  
Alexey I. Shveykin, Perm National Research Polytechnic University, Russia  
16:50 – 17:10      *XFEM applications for integrity analysis of Reactor Pressure Vessels cracked walls*  
V. F. González Albuixech, PSI, Switzerland,

## Thursday, May 16

- 09:00 – 10:20**      **Key Note Lectures (Session III)**  
09:00 – 09:40      *Micromechanically-based models of ductile fracture*  
J-B. Leblond, U. Pierre et Marie Curie, Paris France  
09:40 – 10:20      *Applications of advanced micromechanics based ductile failure models - Do we really need all this complexity?*  
T. Pardoen, Université catholique de Louvain, Belgium
- 10:20 – 10:50**      **Coffee Break**
- 10:50 – 12:10**      **Oral Presentations (Session III)**  
10:50 – 11:10      *Mechanisms for plastic flow localization,*  
C. Tekoğlu, TOBB University of Economics and Technology, Turkey  
11:10 – 11:30      *Strain-induced damage of metals under large plastic deformations*  
M. Zapara, IWM, Germany  
11:30 – 11:50      *Comparing two models for slip-patterning and strain-localization based on a non-convex plastic energy*  
G. Lancioni, Università Politecnica delle Marche, Italy  
11:50 – 12:10      *Ductile damage model for metal forming simulations including physics based modeling of void nucleation*  
A.V. Shutov, Chemnitz University of Technology, Germany
- 12:10 – 13:40**      **Lunch**
- 13:40 – 14:20**      **Key Note Lectures (Session IV)**  
13:40 – 14:20      *Multi-scale brittle fracture modeling and prediction of fracture toughness for irradiated RPV steels*  
B. Margolin, Prometey, Russia
- 14:20 – 14:40**      **Coffee Break**
- 14:40 – 15:40**      **Oral Presentations (Session IV)**  
14:40 – 15:00      *Transferability of brittle fracture properties for different specimens and prediction of fracture toughness for RPV steels*  
V. Kostylev, Prometey, Russia  
15:00 – 15:20      *The prestrain effect on brittle fracture: physical features, mechanical modeling and application for RPV steels*  
V. Shvetsova, Prometey, Russia  
15:20 – 15:40      *Crack-like defects in welded joints - heterogeneity and constraint effects on fracture behavior*  
A. Sedmak, Univ. of Belgrade, Serbia
- 15:40 - 17:40**      **Poster Session**

**Friday, May 17**

**09:00 – 10:20 Key Note Lectures (Session V)**

*09:00 – 09:40 Fracture mechanics of coatings*

J.W. Hutchinson, Harvard University, USA

*09:40 – 10:20 Ductile failure at low stress triaxiality*

J. Faleskog, Royal Institute of Technology, Sweden

**10:20 – 10:40 Coffee Break**

**10:40 – 12:00 Oral Presentations (Session V)**

*10:40 – 11:00 Investigation of creep-fatigue interaction in G91 martensitic steel at 400°C*

R. Heierli, PSI, Switzerland

*11:00 – 11:20 Structure residual life assessment with fatigue process specific accounting*

S. Yutskevych, National Aviation University, Ukraine

*11:20 – 11:40 Viscoelasticity and high buckling stress of dense carbon nanotube brushes*

G. Cambaz-Büke, Cankaya University, Turkey

*11:40 – 12:00 Experimental and computational investigation of dynamic crack growth along curved interfaces*

D. Çöker, Middle East Technical University, Turkey

**12:00 – 12:30 Closing of Workshop**

## POSTER SESSION

- Poster 1** *Stress-deformable state of isotropic plate with four non-through cracks and a circular hole*  
E.N. Dovbnya, N.A. Krupko  
Department of Applied Mechanics and Computer Technology, Donetsk National University, Donetsk, Ukraine
- Poster 2** *Structural reliability approach in thermal fatigue crack growth by stochastic modeling*  
V.S. Radu  
Institute for Nuclear Research, Arges, Romania
- Poster 3** *Mathematical analysis of cracks interaction in anisotropic materials*  
E.-M. Craciun<sup>1</sup>, A. Rabaea<sup>2</sup>  
<sup>1</sup>OVIDIUS University, Constanta, Romania; <sup>2</sup>Technical University of Cluj-Napoca, N.U.C.B.M, Romania
- Poster 4** *Integrity analysis of a reactor pressure vessel subjected to pressurized thermal shocks by considering constraint effect*  
G. Qian, M. Niffenegger  
Paul Scherrer Institute, Nuclear Energy and Safety Department, Laboratory for Nuclear Materials, Villigen PSI, Switzerland
- Poster 5** *Effective spring stiffness for the interfaces between dissimilar solids weakened by periodic array of cracks*  
H. Lekesiz  
Bursa Technical University, Mechanical Engineering Department, Bursa, Turkey
- Poster 6** *Two-level models of polycrystals: investigation of hardening laws influence on the macro effects of complex cyclic loading and damage accumulation*  
P.S. Volegov, P.V. Trusov, A.Y. Yanz, A.I. Shveykin  
Perm National Research Polytechnic University, Perm, Russian Federation
- Poster 7** *A three dimensional model for nanocrystalline materials based on grain interior and grain boundary deformation mechanisms*  
E. Gürses  
Department of Aerospace Engineering, Middle East Technical University (METU), Ankara, Turkey
- Poster 8** *Crystal plasticity based prediction of creep and microcracking in irradiated polycrystalline graphite*  
L. Delannay<sup>1</sup>, J.F.B. Payne<sup>2</sup>, N. Tzelepi<sup>2</sup>  
<sup>1</sup>Université Catholique de Louvain (UCL), iMMC-MEMA, Louvain la Neuve, Belgium; <sup>2</sup>National Nuclear Laboratory (NNL), Stonehouse, United Kingdom
- Poster 9** *Numerical Investigation of Failure Mechanisms and Energetic Distributions in Elastomers at Steady State Crack Propagation*  
K. Özenç, M. Kaliske  
Institute for Structural Analysis, Technische Universität Dresden, Germany
- Poster 10** *The phenomenological model of the fatigue crack growth considering damage accumulation*  
A.V. Plashchynska, P.N. Baranova  
S.P. Timoshenko Institute of Mechanics, National Ukrainian Academy of Sciences, Kyiv, Ukraine
- Poster 11** *Strained-heteroepitaxial quantum dots with anisotropic surface properties*  
M.Y. Sengul<sup>1</sup>, S. Haddadian<sup>1</sup>, A. Çelik<sup>1</sup>, T.Ö. Ogurtan<sup>2</sup>, E.E. Oren<sup>1</sup>  
<sup>1</sup>Department of Biomedical Engineering, TOBB University of Economics and Technology, Ankara, Turkey; <sup>2</sup>Metallurgical and Materials Engineering Department, METU, Ankara, Turkey
- Poster 12** *First-principles and quasi-continuum investigations of the material properties of two systems: dispersive-reinforced Al alloys and Ti/H2 system*  
R. Zaharieva, A. Buzekova-Penkova  
Space Research and Technologies Institute, Bulgarian Academy of Sciences, Sofia, Bulgaria
- Poster 13** *Assessment of fracture initiation point in inclined notch on Brazilian disk under pressure*  
M.H. Meliani<sup>1,2</sup>, Z. Azari<sup>2</sup>, G. Pluinage<sup>2</sup>, Y.G. Matvienko<sup>3</sup>  
<sup>1</sup>LTPM, FS, Hassiba Benbouali University of Chlef, Algeria; <sup>2</sup>Laboratoire de Fiabilité Mécanique, LFM-ENIM, île de saulcy 57045, Université Paul Verlaine de Metz, France; <sup>3</sup>Laboratory of Modelling Damage and Fracture, Mechanical Engineering Research Institute of the Russian Academy of Sciences, Moscow, Russia

- Poster 14** *Cohesive zone modeling of intergranular cracking in polycrystalline aggregates*  
I. Simonovski<sup>1</sup>, L. Cizelj<sup>2</sup>  
<sup>1</sup>European Commission, Joint Research Centre (JRC), Institute for Energy and Transport (IET), Petten, The Netherlands; <sup>2</sup>Jožef Stefan” Institute, Reactor Engineering Division, Ljubljana, Slovenia
- Poster 15** *A Polycrystal Approach to Analyse Texture Evolution during Asymmetrical Rolling*  
R.A. de Sousa,  
Department of Mechanical Engineering, University of Aveiro, Aveiro, Portugal
- Poster 16** *Biomechanical evolution of a novel modular plate, used in spinal surgery*  
E. İnce<sup>1,2</sup>, T. Demir<sup>1,2</sup>  
<sup>1</sup>Department of Mechanical Engineering, TOBB University of Economics and Technology, Ankara, Turkey; <sup>2</sup>Labiotech Biomechanics Laboratory, Ankara, Turkey
- Poster 17** *Polymer brush grafted magnetic nanoparticles for highly efficient water remediation*  
Z. Oluz<sup>1</sup>, E. Tuncel<sup>1</sup>, B. Yameen<sup>2</sup>, A. Farrukh<sup>3</sup>, H. Duran<sup>1</sup>  
<sup>1</sup>Dept. Mater. Sci. & Nanotechnol. Eng., TOBB University of Economics and Technology, Ankara, Turkey; <sup>2</sup>Karlsruhe Institute of Technology (KIT), Institute for Technical and Polymer Chemistry, Karlsruhe, Germany; <sup>3</sup>Dept of Chem., School of Sci. and Eng., Lahore University of Management Sci., Lahore, Pakistan
- Poster 18** *In-vitro investigation of fusion effect on pedicle screws in terms of pullout strength*  
M.F. Örmeci<sup>1,2</sup>, T. Demir<sup>1,2</sup>, A.K. Arslan<sup>3</sup>  
<sup>1</sup>Department of Mechanical Engineering, TOBB University of Economics and Technology, Ankara, Turkey; <sup>2</sup>Labiotech Biomechanics Laboratory, Ankara, Turkey; <sup>3</sup>Gölbaşı Hasvak State Hospital, Ankara, Turkey
- Poster 19** *The effect of per-phase properties on the ductility of dual phase (DP) steels*  
M. İnanç<sup>1</sup>, T. Pardoen<sup>2</sup>, O. Bouaziz<sup>3</sup>, C. Tekoğlu<sup>1</sup>  
<sup>1</sup>Department of Mechanical Engineering, TOBB University of Economics and Technology, Ankara, Turkey; <sup>2</sup>Institute of Mechanics, Materials and Civil Engineering, Université catholique de Louvain, Louvain-la-Neuve, Belgium; <sup>3</sup>Arcelor Research, Maizières-les-Metz Cedex, France
- Poster 20** *Reliability estimation of aircraft structures using tail modelling*  
N. Kandemir, E. Acar  
Department of Mechanical Engineering, TOBB University of Economics and Technology, Ankara, Turkey
- Poster 21** *Probabilistic optimization of a stiffened fuselage panel under fracture constraints*  
R.Ç. Usta, E. Acar  
Department of Mechanical Engineering, TOBB University of Economics and Technology, Ankara, Turkey
- Poster 22** *Void coalescence under combined tension and shear*  
S. Attari<sup>1</sup>, T. Pardoen<sup>2</sup>, J.-B. Leblond<sup>3</sup>, C. Tekoğlu<sup>1</sup>  
<sup>1</sup>Department of Mechanical Engineering, TOBB University of Economics and Technology, Ankara, Turkey; <sup>2</sup>Institute of Mechanics, Materials and Civil Engineering, Université catholique de Louvain, Louvain-la-Neuve, Belgium; <sup>3</sup>Institut Jean-Le-Rond-d’Alembert, Université Paris VI, Paris, France
- Poster 23** *Selective plasma damage for obtaining free one dimensional nanoparticles*  
S. Altuntas<sup>1</sup>, F. Buyukserin<sup>2</sup>  
<sup>1</sup>Micro and Nanotechnology Graduate Program TOBB University of Economics and Technology, Ankara, Turkey; <sup>2</sup>Department of Biomedical Engineering TOBB University of Economics and Technology, Ankara, Turkey
- Poster 24** *Experimental modal analysis of a pressurized Composite tube with cracks*  
A. Akturk, K. Kazkan, A. Kotanci, M. Yetmez  
Department of Mechanical Engineering, Bulent Ecevit University, Zonguldak, Turkey