

1st INTERNATIONAL WORKSHOP ON PHYSICS BASED MODELING OF MATERIAL PROPERTIES AND EXPERIMENTAL OBSERVATIONS

22-23 October 2012 Ankara—TURKEY



The objective of the workshop, co-organized by Joint Research Centre and Middle East Technical University, is to discuss the present status of physics based constitutive modelling of materials and associated experimental methods. Such approaches allow a better understanding of degradation mechanisms and how the microstructure affects material behavior, which is necessary for extrapolation of data beyond operational experience and for the assessment of component integrity subjected to harsh environments and long-term operation. The Workshop is funded through the EU Enlargement & Integration Action (E&IA).



CONFIRMED KEYNOTE SPEAKERS

Prof. Dr. Alan Needleman, UNT

Prof. Dr. Jean-François Molinari, EPFL

Prof. Dr. William Curtin, EPFL

Prof. Dr. Fionn Dunne, Univ. Oxford

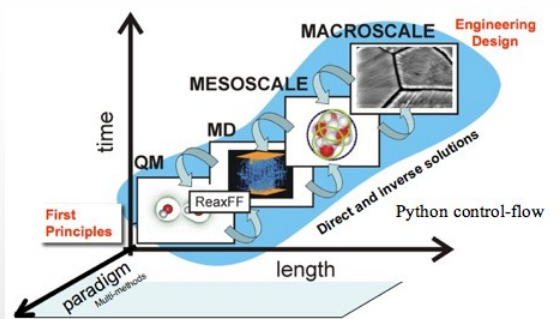
Prof. Dr. Bob Svendsen, RWTH Aachen - MPIE Düsseldorf

Dr. Lorenzo Malerba, SCK-CEN

Prof. Dr. Doron Shilo - Technion Haifa

WORKSHOP SCOPE

The safety and the long-term behaviour of the structural components under service loads (e.g. in nuclear reactors) depends on the evolution of the material micro-structure. Material properties for components that approach the end of life, or which are subjected to very harsh environments are usually not available. The development of physics-based models, which address phenomena at different time and length scales, offer an opportunity to understand how material properties and the degradation mechanisms such as fatigue, creep, irradiation could be predicted for the long-term behavior and component integrity.



This workshop will give an overview of the different physics-based models and the experimental studies for metallic materials. The emphasis will be on the meso-scale, corresponding to grains, which is the relevant length-scale for many basic material properties and degradation mechanisms. Associated experimental studies and the multi-scale models from dislocation dynamics via crystal plasticity to phenomenological macro-scale studies are in the scope of the workshop.

Organizers:

Dr. Demirkan Coker, Middle East Technical University

Dr. Ercan Gurses, Middle East Technical University

Dr. Karl-Fredrik Nilsson, JRC - European Commission

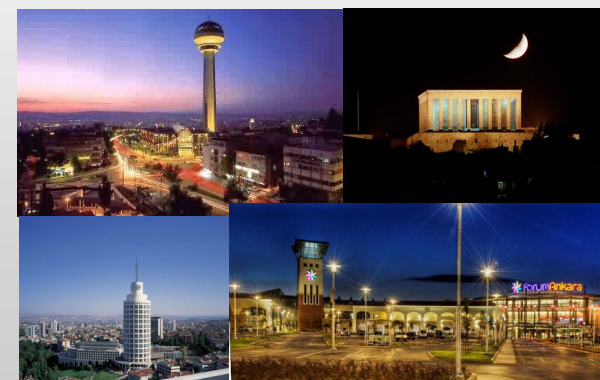
Dr. Tuncay Yalcinkaya, JRC - European Commission

WORKSHOP VENUE

The workshop will be held in Ankara, which is the capital city of Turkey. The university is situated 10 km to the west of the city center with an area of 11000 acres of which 7500 acres constitute the METU forest. The history of Ankara and its surroundings goes back to Hatti civilization of the Bronze Age. Two thousand years before Christ, the Hittites became the dominant power of the region and were then followed by Phrygians, Lydians, and Persians. In the 3rd Century BC a Celtic race known as the Galatians made Ankara their capital city. The name Ankara comes from the word **Ancyra**, which means anchor.

GETTING THERE

Many direct flights are available to Ankara from different European cities. Moreover, Turkish Airlines present a wide range of flights to Istanbul Ataturk International Airport which has perfect connection to Ankara international airport. From the airport, which is 33 km Northeast of the city one can take shuttle bus Havas (5 Euro) to ASTI bus terminal or Ankara Gar Train station. A taxi would cost around 30 Euros to the center.



WORKSHOP FORMAT

The purpose of the workshop is to bring together the international scientists with researchers from the **target countries** of *E&IA (Enlargement & Interaction Action)* of European Commission.

The workshop will be a 2 day event based on the oral presentations from the invited international lecturers, presentations by participants and a Poster Session.

A number of Grants to cover travel and accommodation is available for participants from the E&IA target countries.

In addition to the invited experts and the participants from the target countries, the workshop is open to the international community who are willing to attend or present their work on physically based constitutive modelling and experimental observations. Participants could be graduate students or scientists from Academia or industry.

REGISTRATION FEE & FUNDING

There is no registration fee for the workshop. The refreshments at the coffee breaks, the lunches and the workshop dinner will be **free of charge** for all participants. The travel costs of attendees with Grant (economy flight + hotel + daily allowance) from the target countries will be reimbursed after the workshop. European Commission reserves the right to decide on the grants on a case by case basis depending on the available budget.

TARGET COUNTRIES

In the frame of E&IA (Enlargement & Interaction Action), the JRC offers specialized workshops, advanced training courses, and small projects with a focus on experts from the new member states (Romania, Bulgaria), candidate countries (Croatia, Turkey, Macedonia, Iceland, Montenegro), Potential candidate countries (Serbia, Albania, Kosovo, Bosnia-Herzegovina), FP7 Associate countries (Switzerland, Israel, Norway, Lichtenstein, Faroe Island, Moldova), European Neighborhood Policy countries (Algeria, Armenia, Azerbaijan, Belarus, Egypt, Georgia, Jordan, Lebanon, Libya, Morocco, Occupied Palestinian Territory, Syria, Tunisia, Ukraine) and Russia.

KEY DATES

- Deadline for abstract submission 10.08.2012
- Notification of abstract acceptance 25.08.2012
- Announcement of grants 25.08.2012
- Deadline for registration 10.09.2012
- **Workshop** 22.10.2012 - 23.10.2012

ABSTRACT SUBMISSION AND REGISTRATION

Abstracts not exceeding 400 words, for presentations and Posters, are to be submitted by email to the JRC contact persons. At the Workshop all Abstracts will be available for the participants. After the Workshop a European Commission JRC scientific report with Workshop Proceedings will be published. The registration will be finalized via a form which will be obtained from JRC contact persons. The number of participants is limited and preference will be given participants who submit an Abstract or participants from target countries.

CONTACTS

The workshop is advertised on the following EC web-page: Ec.europa.eu/dgs/jrc/index.cfm?id=3080

Direct link to the information and grant application: Ec.europa.eu/dgs/jrc/downloads/enlargement/eia2012/2012-iet-a-07.pdf

Applications for the grants should be sent to:

jrc-enlargement@ec.europa.eu with the subject:2012-IET-A-07

These applications will be redirected to the JRC contact persons for review.

JRC contacts (Abstract submission, Registration):

tuncay.yalcinkaya@ec.europa.eu

karl-fredrik.nilsson@jrc.nl

Middle East Technical University contacts

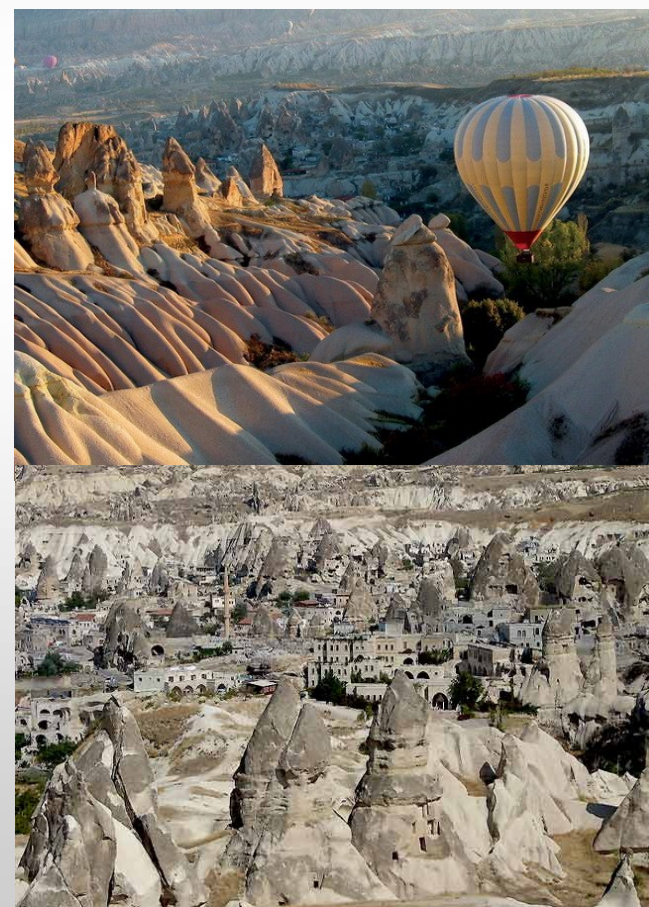
gurses@metu.edu.tr and coker@ae.metu.edu.tr

ACCOMMODATION

Aerospace Engineering Department of Middle East Technical University is going to reserve cheap accommodation close to the workshop venue in the guest houses. For the arrangement please contact METU contact persons Dr. Ercan Gurses and Dr. Demirkan Coker. Participants willing to stay in the hotels could easily reserve high quality hotels in the vicinity of the university or in the city center of Ankara via internet.

SOCIAL PROGRAMME

A visit to the ancient region of Anatolia, **Cappadocia**, will be arranged in the third day of the workshop on 24.10.2012. The cost of the regarding trip will not be covered from the grant. Please contact organizers for the additional information.



TECHNICAL PROGRAMME

Welcome talk - Material Issues in Nuclear Applications

* **Karl-Fredrik Nilsson, JRC - Netherlands**

Key-note Lectures

* **Alan Needleman, UNT - US**

Porosity Evolution in Ni-based Single Crystals under Creep Loading Conditions

* **Jean-François Molinari, EPFL - Switzerland**

Nanoscale modeling of sliding contact

* **William Curtin, EPFL - Switzerland**

First-principles Predictions of Solute Strengthening in Al and Mg alloys

* **Fionn Dunne, Univ. Oxford - UK**

The role of elastic anisotropy, length scale and crystallographic slip in fatigue crack nucleation

* **Bob Svendsen, RWTH Aachen - MPIE Düsseldorf - Germany**

Formulation of thermodynamic mean-field models for dislocation transport at finite deformation

* **Lorenzo Malerba, SCK-CEN - Belgium**

Multiscale modelling applied to structural nuclear materials

* **Doron Shilo - Technion Haifa - Israel**

Multi-scale Dynamics of Twinning Processes

Technical Presentations

* **Tuncay Yalcinkaya, JRC - Netherlands**

Modeling of localization and microstructure evolution in metallic materials

* **Ercan Gurses, METU - Turkey**

Multiscale Modeling of Nanocrystalline Metals Based on Competing Grain Boundary and Grain Interior Deformation Mechanisms

* **Tarek Hatem, British University Cairo - Egypt**

Microstructural modeling of heterogeneous failure modes in martensitic steels

* **Roussislava S. Zaharieva, Space Research and Technology Institute - Bulgaria**

Ab initio molecular dynamics study on the effects of mechanical strain on the chemical reactions of W+CO and Ti+H₂

* **Andrei Kotlierenko, National Academy of Science - Ukraine**

Crack propagation and arrest peculiarities in steels at transient loading

* **Minh-Son Pam, Federal Laboratories for Materials Science and Technology - Switzerland**

Constitutive model for cyclic deformation response of AISI 316L based on relationships between internal stress and dislocation microstructure

* **Pavel Volegov, Perm National Research Laboratory - Russia**

Hardening models in multilevel models of inelastic deformation based on crystal plasticity

* **Tomas Manik, Norwegian University of Science and Technology - Norway**

Modeling of transients as a response to changes in strain-path of commercially pure aluminum

* **Ludmilla Botvina, Baikov Institute of Metallurgy and Materials Science**

Degradation of carbon steels after long-term ageing

* **Can Ayas, University of Cambridge - UK**

Climb Enabled Discrete Dislocation Plasticity of Particle Reinforced Composites

* **Atilim Eser, RWTH Aachen - Germany**

Physics based modelling of high temperature mechanical behaviour of tool steels

* **Can Aydinler, Bogazici University - Turkey**

Grain-level in-situ observations on deformation twinning

* **Trentyev Dmitry, SCK-CEN - Belgium**

Blunting and brittle cleavage of a crack in BCC and FCC metals: atomistic modeling vs. theoretical estimations

* **Cihan Tekoglu, TOBB University of Economics and Technology - Turkey**

A criterion for the onset of void coalescence under combined tension and shear

* **Milos Moravec, CTU Prague - Czech Republic**

Identification of Plasticity parameters for models of ductile damage of nuclear facilities

* **Jingxing Liu, KAUST - Saudi Arabia**

Effects of surface energy on evolution of a nanovoid in a plastic material

* **Ilker Temizer, Bilkent University - Turkey**

Homogenization-based scale transitions in finite deformation thermomechanics