In this paper, a new elastic/plastic damage model with yield criterion that depends on all stress invariants is used to investigate the influence of the tension-compression asymmetry of the incompressible matrix on void evolution of a porous aggregate. For uniaxial tensile loading conditions, it is shown that if the matrix tensile strength is higher than its compressive strength, damage distribution is similar to that in classical materials obeying Gurson's criterion while the void growth rate is faster. On the other hand, for certain porous polycrystals in which the matrix tensile strength is lower than its compressive strength, damage distribution is significantly different, the location of the zone of maximum porosity shifts from the center of the specimen outwards. Depending on the value of the parameter k, damage is delayed and the void growth rate is much slower. The effects of evolving microstructure are also investigated revealing new and unexpected trends.

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**16:05–213A+B**

### Effect of twinning on the large strain torsion of extruded AZ31 bars

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The large strain torsion of polycrystalline materials with the Hexagonal Close Packed (HCP) crystallographic structure is numerically studied by using a special purpose finite element. All the simulations are based on the recently developed large strain Elastic Visco-Plastic Self-Consistent (EVPSC) model for polycrystalline materials. It is found that the response of large strain torsion of HCP polycrystals is very sensitive to the initial texture and texture evolution. It is numerically demonstrated that twinning has a significant influence on the large strain torsion of HCP polycrystals. For the magnesium alloy AZ31 extruded bar, the predicted results are in good qualitative agreement with experimental observations.

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**16:25–213A+B**

### Shakedown of functionally graded structures subjected to plastic strain induced phase transformation

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The present paper aims at showing that the phase transformation process may substantially accelerate shakedown of structures subjected to cyclic loads at cryogenic temperatures. Metastable, type fcc metals and alloys undergo at low temperatures the plastic strain induced fcc-bcc phase transformation that consists in creation of two-phase continuum, where the parent phase coexists with the inclusions of secondary phase in thermodynamic equilibrium. Evolution of material micro-structure induces strain hardening related to interaction of dislocations with the inclusions and to increase of equivalent tangent stiffness as a result of evolving proportions of both phases. The corresponding hardening model is based on micromechanics and on the Hill concept supplemented by Mori-Tanaka homogenisation scheme. Phase transformation in rectangular beams and circular rods subjected to cyclic loads at cryogenic temperatures was analysed. As soon as the fcc-bcc phase transformation begins, the evolution of material micro-structure accelerates the shakedown of structure subjected to cyclic loads.

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**16:45–213A+B**

### Correction of shear creep compliance determined by conical indentation

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Instrumented indentation is an efficient and convenient tool for probing time-dependent behaviors of polymers and biomaterials. Several methods for determination of shear creep compliance from indentation measurements have been proposed in the past decade. A large number of numerical experiments are used here to verify these methods. It is found that the shear creep compliance determined by conical indentation is systematically smaller than that determined by uniaxial tension which is equal to the theoretical result. And the systematic error is associated with the Poisson's ratio and relaxation factor of sample, and the half-angle of conical indenter. Smaller Poisson's ratio, larger relaxation factor and larger half-angle lead to larger systematic error. Finally, after correction with a correction factor which depends on the Poisson's ratio and relaxation factor of sample and the half-angle of indenter, the shear creep compliance determined by conical indentation consists well with the theoretical result.

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**17:05–213A+B**

### Aspects on the use of wind lidar measurements up to 600 meters for wind energy studies: wind profile, weibull distribution and boundary layer height

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We present and discuss some recent aspects and experimental data on the use of wind lidar measurements. The study is based on one-year pulsed lidar (Wind Cube 70) measurements of wind speed and direction from 100 to 600 m with a vertical resolution of 50 m and temporal resolution of 10 min at a coastal site in Denmark. One year of long range wind lidar measurements up to 600 m