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Short Professioal details and affiliation: Marko Knezevic earned his BS degree in Mechanical Engineering from the University of Novi Sad (Serbia) in 2004 and his Ph.D. in Materials Science and Engineering from Drexel University in 2009. After graduate school, he joined Scientific Forming Technologies Corporation in Columbus, OH from 2009 to 2011 as a principal research scientist for development of the commercial finite-element software DEFORM used for analysis of manufacturing processes. After industrial experience, he was with the Materials Science and Technology Division at Los Alamos National Laboratory in Los Alamos, NM from 2011 to 2013 as the LANL Seaborg Institute Postdoctoral Fellow. He then joined the faculty of the Mechanical Engineering Department at the University of New Hampshire. Prof. Knezevic's research is focused on understanding of materials behaviour under complex loading using a combination of computational methods and experiments, development of constitutive material models, design and manufacturing at component levels, materials design at microstructural length scales, as well as the development of high-performance computational applications integrating multi-scale material models for predicting materials behaviour. His work has produced about 250 archival journal articles.

Plenary lecture

Strain-gradient crystal plasticity models for predicting microstructure, length-scale, and strain path sensitive deformation behavior of polycrystalline metals

Abstract: The presentation will begin by summarizing a full-field strain-gradient (SG) crystal plasticity finite element (CPFE) model, which considers the roles of microstructural length-scales. The potential and utility of the model to simulate mechanical response, strain gradients, and associated slip-system level geometrically necessary dislocations (GNDs) will be demonstrated via a few simulation case studies involving a set of strain-path change deformation conditions of AA6016. A high-fidelity verification of the predicted GNDs will involve comparisons with those observed using 3D structures extracted, via serial sectioning, following application of the strain paths. A key limitation of such SG-CPFE modeling pertains to the scale and requirements for microstructural meshes of explicit grain structures. In light of this, the subsequent part of the presentation will describe a formulation of a homogenization-based SG formulation linking micro-scale single-crystal to meso-scale polycrystalline aggregate to macro-scale component level modeling of geometrical shape changes under complex deformation boundary conditions while predicting mechanical response and microstructural evolution.