A discrete sampling approach to evaluating artifacts in orientation distribution functions reconstructed from sparse pole figures

Daniel Savage*[1] and Sven Vogel

[1]Los Alamos National Laboratory – United States

Abstract

Diffraction experiments generally sample a small number of specimen directions and poles, resulting in the so-called sparse experimental pole figures. Ideally, many specimen directions and poles are sampled, and using full pattern fitting and models such as E-WIMV or MTEX, the orientation distribution function (ODF) can be reconstructed. The choice of ODF model must be appropriate given the experiment, specimen symmetry, crystal symmetry, and specimen texture strength. However, tools for evaluating whether an ODF is appropriate or useful for certain types of analysis (e.g. component analysis vs. intensity analysis) are largely lacking. In this talk, we present a methodology built on MTEX for evaluating the reconstruction of known unimodal ODFs from synthetic experimental pole figures. Using this methodology, orientations, component intensity, and other metrics can be compared to a ground truth across orientation space. We will demonstrate the methodology with two case studies: 1) effects of detector coverage and sample rotation at the HIPPO time-of-flight neutron diffractometer and 2) evaluation of ODF reconstruction artifacts from X-ray diffraction collected in-situ during laser driven shock of titanium.

*Speaker