

Kolloquium für Mechanik

Referent: **Professor Adam Morawiec**
Institute of Metallurgy and Materials Science, Polish Academy of Sciences,
Poland

Date: Tuesday, January 30, 2018
Time: 10:00h
Location: Bldg. 10.23, 3rd Floor, Room 308.1 (KM-SR)

Title: **On representing rotations in lattice frames with redundant
crystallographic axes**

Abstract

Analysis of crystallographic textures relies on the notions of reference frames and 3D rotations. Besides the usual representation of proper rotations by special orthogonal matrices, quite common is the use of rotation vectors; in particular, the so-called Rodrigues parameters are convenient in analysis of crystal misorientations. These representations are standardly specified using Cartesian coordinate systems, whereas bases of crystal lattices are generally non-orthogonal. Moreover, the conventional description of crystals with hexagonal or rhombohedral lattices is based on frames with redundant axes. The talk will be about a general formalism valid not only for arbitrary lattice bases, but also for frames with redundant crystallographic axes. The formalism allows for a generalization of the classic schemes of indexing of lattice planes and directions, and it can be used for dealing with rotations. The Rodrigues parameterization of rotations in general frames is convenient for crystallographic applications because the generalized Rodrigues parameters are directly related to indices of rotation-invariant lattice directions and to Miller indices of rotation-invariant lattice planes. In the case of the hexagonal and trigonal crystal systems, the frames with redundant axes are used to account for symmetries of crystal lattices, but one may apply such frames for handling other symmetries, in particular symmetries arising in description of physical processes. The practicality of frames will be illustrated by an alternative formula for lattice rotation in deformation by slip.

Alle Interessenten sind herzlich eingeladen.

Prof. Dr.-Ing. Thomas Böhlke