1077-41-1819 **Helmut Schaeben*** (schaeben@tu-freiberg.de), Geophysics and Geoscience Informatics, TU Bergakademie Freiberg, Gustav-Zeuner-Strasse 12, 09596 Freiberg, Germany. *Mathematical Texture Anaylsis.*

Texture analysis here means sampling, analyzing, and interpreting crystallographic preferred orientation. Crystallographic orientations are basically cosets of SO(3). Texture has initially been described by the orientation probability density function modeling the frequency of crystallographic orientations by volume. Diffraction experiments with X-rays, Neutron or synchrotron radiation provide integral measurements of crystallographic orientation which can basically be modeled by the totally geodesic Radon transform for SO(3). Then the numerical inversion of the Radon transform applied to these discrete pole intensity data yields the orientation probability density function. Electron Back Scatter Diffraction (EBSD) experiments allow to sample individual crystallographic orientations with spatial reference. Non-parametric kernel density estimation is applied to estimate the orientation probability density function, while the spatial reference and modeling assumptions are used to reconstruct crystallographic grain boundaries and corresponding grains in terms of incidence and adjacency matrices. Once the grains are modeled, various misorientation functions can be investigated as well as their geometry and topology. (Received September 21, 2011)