

COMPUTATIONAL TEXTURE ANALYSIS WITH MTEX

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The software MTEX is a free and open source MATLAB toolbox for texture analysis based on integral (“pole figure”) or individual (“EBSD”) orientation measurements. Based on series expansion into radially symmetric basis functions (“kernels”), which are sufficiently well localized in spatial and frequency domain, MTEX features a unique approach to analyse both kinds of data. A kernel itself is approximated by a finite harmonic series to apply fast Fourier techniques.

MTEX provides several interfaces for individual or integral orientation data. In case of individual orientation measurements an ODF is determined by non-parametric kernel density estimation where the measurements are the centres of the kernels to be superposed. In case of integral orientation measurements an ODF is modeled as a non-negative linear combination of kernels where the weights are computed as the solution of a minimization problem which is based on a model of the diffraction counts as a Poisson process. MTEX provides various functions to compute distinguished properties of an ODF as C-coefficients, modal orientation, mean orientation, volume portions, texture index, entropy, etc., which are of interest. Choosing the Dirichlet kernel for the density estimation, unbiased estimates of the C-coefficients up to any reasonably given finite order may be computed. In particular, MTEX provides functions to numerically compare ODFs, e.g. determined from individual and corresponding integral orientation measurements, respectively. Moreover, another function of MTEX allows for large-scale simulation of individual orientation measurements given any ODF. Thus, MTEX features a unique approach to analyse individual or integral orientation measurements.