

Towards high angular resolution EBSD : development of new indexation algorithms

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An EBSD pattern is nothing more than the projection of the lattice cell, Kikuchi band centres corresponding to crystallographic plane traces with their intersections being crystallographic directions. Hence careful geometrical measurements on the EBSD pattern theoretically yield a precise description of the lattice geometry and its orientation.

However, many issues are to be addressed before indexing an EBSD pattern with high angular resolution :

- The gnomonic projection of the sphere onto the tangential phosphor screen is non-conservative (both for distance and trigonometry).
- The precision of geometrical measurements depends on the source centre position commonly called “pattern centre”.
- Plane traces are not visible on the pattern : they lie somewhere in-between the Kikuchi band edges, which form hyperbolas.
- Potential distortions, due to the imaging system, are to be calibrated.

This contribution aims at describing recent work done to tackle these points : a specific band detection algorithm is being developed, which allows for the determination of crystallographic planes with a 0.01° precision.

Incidentally, this algorithm can be adapted for the automatic indexing of Kossel patterns.

Preliminary tests on EBSD simulated patterns yield a precision of 2×10^{-4} on the elastic strain measurements.