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# The Variant Graph Approach to Parent Grain Reconstruction

Ralf Hielscher\*<sup>1</sup>

<sup>1</sup>Technische Universität Bergakademie Freiberg – Germany

## Abstract

The variant graph is a new, hybrid algorithm that combines the strengths of established global grain graph and local neighbor level voting approaches, while alleviating their shortcomings, to reconstruct parent grains from orientation maps of partially or fully phase-transformed microstructures. The variant graph algorithm is versatile and is capable of reconstructing transformation microstructures from any parent-child combination by clustering together child grains based on a common parent orientation variant. The main advantage of the variant graph over the grain graph is its inherent ability to more accurately detect prior austenite grain boundaries.

In our talk we focus on the theoretical background of the new algorithm. To this end we first introduce the well established grain graph and voting based algorithms for parent grain reconstruction. Subsequently, we showcase the variant graph based algorithm as a generalization of both previous approaches. We discuss the impact of the important parameters to the quality of the reconstruction, the runtime and the required memory. As the variant graph is now the default method for parent grain reconstruction in MTEX we give also some details about its implementation.

**Keywords:** parent grain reconstruction, MTEX, phase transformation

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\*Speaker