Fitting Subdivision Surfaces on Three Dimensional EBSD Maps

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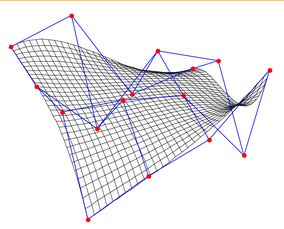
Introduction

Grain boundaries are important microstructural elements that can be represented by surfaces. Their complexity demands a 3D free-form, watertight and smooth representation.

Subdivision surfaces provide significant gains over a NURBS (Non-uniform rational B-spline) representation.

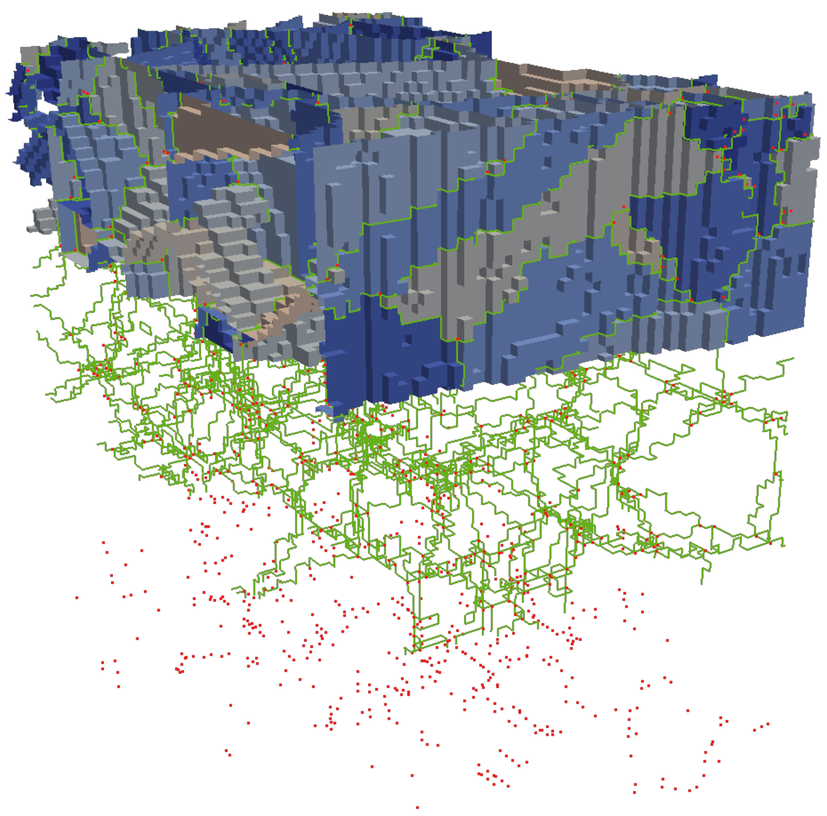


Subdivision surfaces:

- allow creases (sharp edges).
- allow arbitrary topology (not just four-sided domains).
- eliminate many of the problems that can occur at seams when creating or moving NURBS.

Implementation

Identifications of features

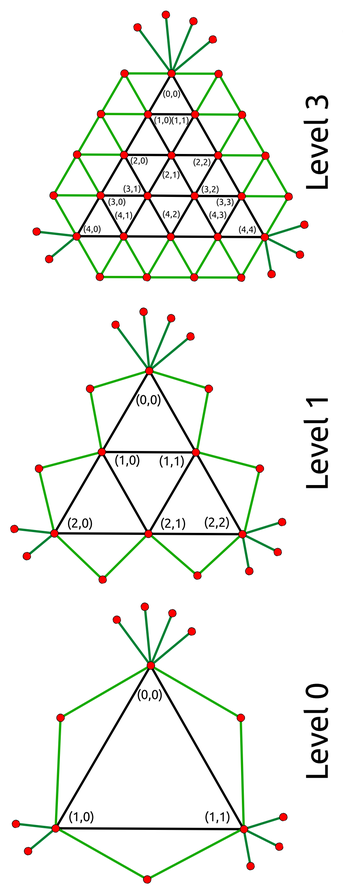


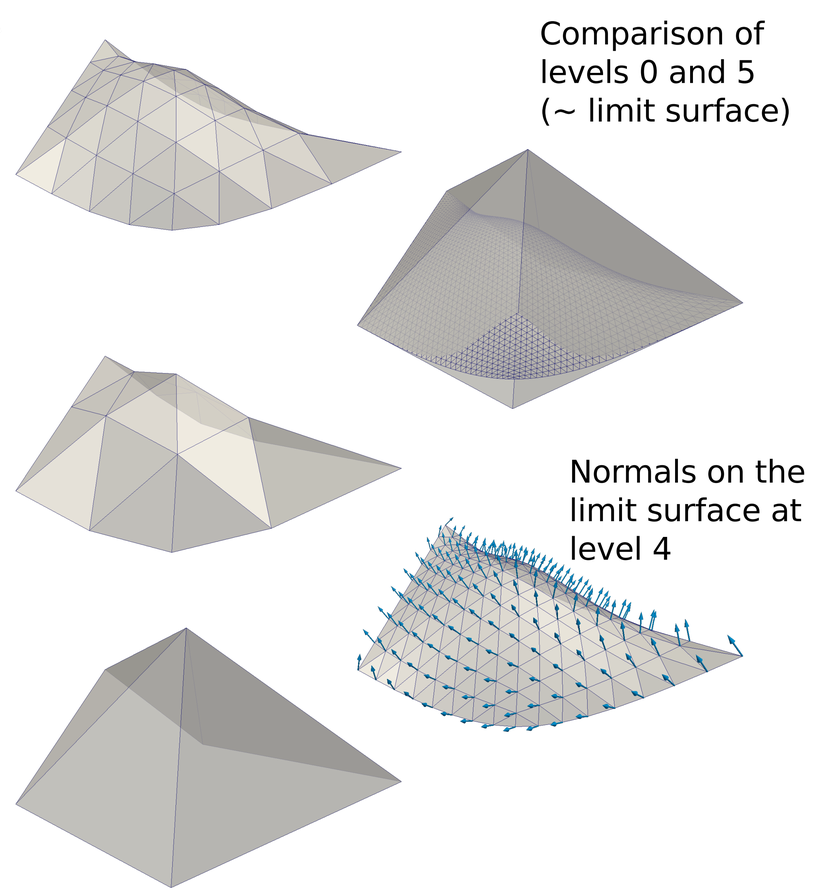
Boundaries

Triple-lines

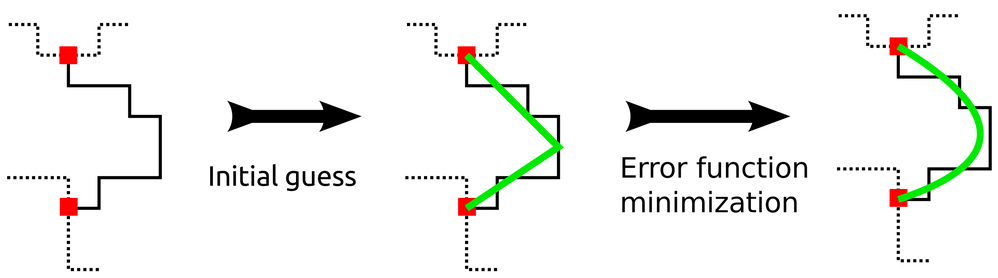
Junctions

Subdivision Surfaces

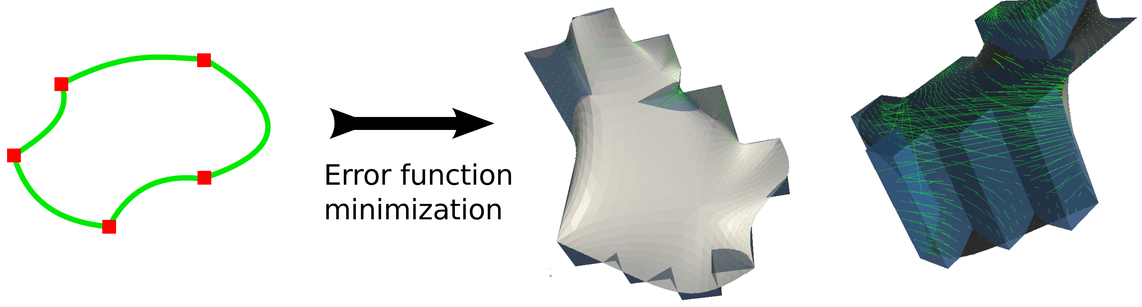




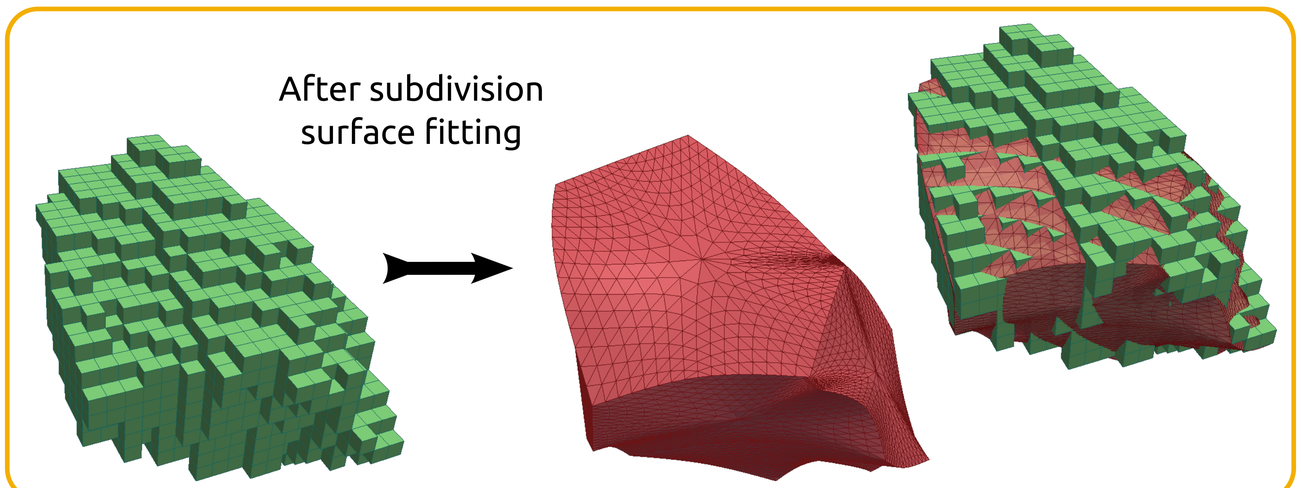
One dimension fitting on triple-lines

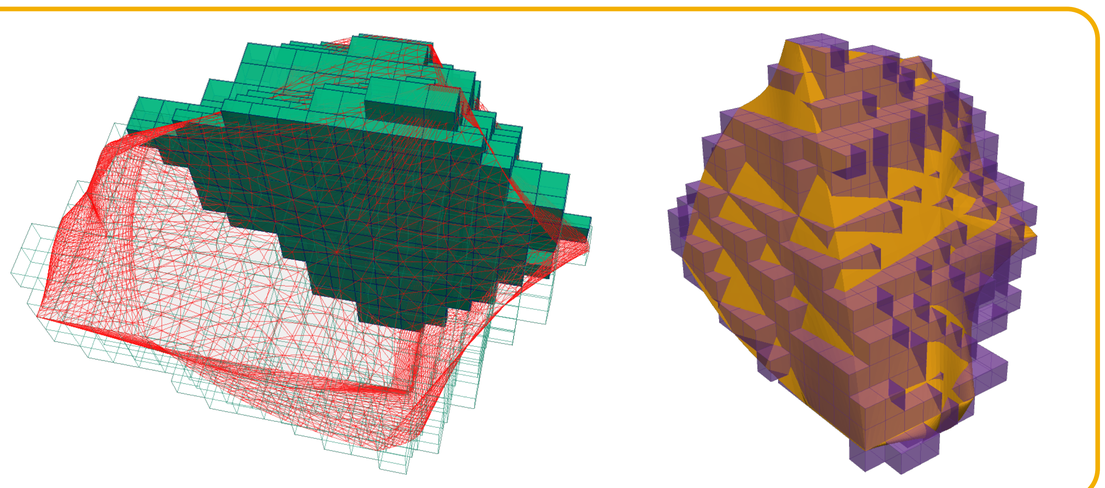


Two dimensions fitting on grain boundaries



Results





Summary

- Surface subdivision offers a suitable alternative for grain boundary smoothing of voxelaxed structure.
- Fixed degree of smoothing may lead to a sub-optimum fitting. Therefore, dynamic degree of smoothing would be a valuable improvement.