

On the accuracy of image-based interface normal determination for composite voxel methods in computational micromechanics

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The composite voxel method permits to accelerate FFT-based computational homogenization methods by providing a substitute constitutive law for heterogeneous voxels. We introduce novel ways of estimating the interface normal of composite voxels which apply to the coarsening of digital, i.e., pixel- and voxel-based microstructures. In fact, heterogeneous voxels arise when coarsening a fine voxel grid by condensing multiple fine-scale voxels into a single voxel, whose constitutive law is based on laminate theory. We compare multiple normal-estimation techniques for digital image data regarding their accuracy through dedicated numerical examples.