

First we define marked tessellations to use as a model for polycrystalline structure. Then we list the necessary descriptions of orientations to use as marks for the tessellation. We formulate the necessary theory of Markov chains, so that we can use MCMC algorithms. The main goal is to simulate possible distributions of misorientations between neighboring cells of a tessellation. For that we formulate a parametric stochastic model and show, that we can simulate from the target distribution using an MCMC method. In the final chapter, we discuss how the results depend on the parameter and geometry of the tessellation.