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The effects of a DC field on the orientation of Ni-based single crystal growth were researched in this report. A single crystal superalloy with different original orientations grows under the DC field. The orientation of the Ni-based single crystals was measured by the XRD method. It is found that the misorientation from [001] of the Ni-based single crystal superalloy becomes smaller which grows with the DC field. The misorientation of the single crystal superalloy is decreased from 18 degrees to 10 degrees, and then decreased to 3 degrees under the action of the DC field. The change of misorientation caused by the electric field is considered that is from the variation of asymmetric temperature and solute diffusion in front of the S/L interface. When growing the single crystal superalloy under the electric field, Joule heat and electromigration taking place in front the interface perturb the temperature and solute diffusion and change their asymmetric.