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**Phase field model for recrystallization kinetics** S. SREEKALA, Mechanical and Aerospace Engineering, Princeton University, MIKKO HAATAJA, Mechanical and Aerospace Department, Princeton University — In the recrystallization process, dislocation-free grains grow at the expense of highly deformed matrix. We introduce a phase-field model to study the isothermal recrystallization process as a phase transformation driven by the stored elastic energy which is explicitly non-local due to the long-ranged dislocation strain fields. The dislocations are represented by a coarse-grained Burgers vector density in two spatial dimensions. We have used this model to study the influence of several spatially distinct dislocation distributions (random, cellular and power-law correlated) on the growth kinetics of the recrystallized grain. Our results show that random dislocation distribution produces isotropic growth, whereas the other two distributions show anisotropic and irregular growth as seen in experiments. Also, the growth rate for the random and power-law correlated dislocation distribution follows the JMAK theory rather closely, while the highly anisotropic cell structure shows significant deviations. We demonstrate that the deviations arise from the presence of non-local elastic strain fields.

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