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Abstract

Numerical Simulation of Ni Grain Growth in a Thermal Gradient

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The Potts model is well developed to simulate normal, curvature-driven grain growth and has been used extensively to study various aspects of grain growth. In this work, we use this model, implemented into the SPPARKS [1] code, to simulate grain growth of Ni turbine blades that are heat treated with temperature gradient intentionally introduced to vary the grain size for varied mechanical properties across the extent of the blade. We will present the model, demonstrate its application and estimate mechanical properties as a function of position.

References

[1] S. Plimpton, C. Battaile, M. Chandross andG. Wagner, E. Webb, X. Zhou, C. Garcia Cardona, and A. Slepoy. Crossing the mesoscale no-man's land via parallel kinetic monte carlo. Sandia Report SAND2009-6226, Sandia National Laboratories, Albuquerque, NM, October 2009.

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