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Simulating thermal transport in high contrast composite media HARSHADEWA S. GUNAWARDANA, KIERAN MULLEN, Homer L. Dodge Department of Physics and Astronomy, The University of Oklahoma, DIMITRIOS V. PAPAVASSILIOU, Department of Chemical Engineering, University of Oklahoma — In dealing with transport in composites systems, high contrast materials pose a special problem for numerical simulation: the time scale or step size in the high thermal conductivity material must be much smaller than in the low conductivity material. High conductivity inclusions can be treated as having an infinite conductivity, removing the need to model transport within the high conductivity inclusions. We develop a random walk algorithm to model thermal transport in composites with high conductivity. We observed the standard random walk algorithm leads to non uniform temperature distribution at the vicinity of the high conductivity inclusion violating the second law of thermodynamics. We show how a standard random walk algorithm can be altered to improve speed while still preserving the second law of thermodynamics. We demonstrate the algorithm in 1D and 3D systems.

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