

An Extended Finite Element Method (XFEM) Based Topology Optimization for Nano-Scale Heat Transfer

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An extended finite element method (XFEM) is proposed for the topology optimization of nano-scale heat transfer via kinetic theory approaches. The boundary and interfacial condition are accurately imposed by the projected Lagrange multiplier. In the sensitivity analysis, the adjoint method is applied through numerical finite differencing and analytically derived formulation. Numerical examples are illustrated with the design of nano-composite materials for regulating thermal conductivity. As a whole, XFEM shows promising kinetic theory approaches for topology optimization problems.