Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Efficient Numerical Modeling of Nonequilibrium Fluctuation Phenomena M. T. HOMER REID, Massachusetts Institute of Technology, ALEJANDRO RODRIGUEZ, Harvard University; Massachusetts Institute of Technology, STEVEN JOHNSON, Massachusetts Institute of Technology — We present efficient numerical methods for computing non-equilibrium Casimir forces and radiative heat transfer between bodies of complex shapes and realistic material properties. Our methods borrow techniques from computational electromagnetism (specifically, surface integral equations and boundary-element methods) to describe fluctuations in *fields* in terms of fluctuating *sources* on the surfaces of material bodies. We obtain concise formulas expressing forces and heat-transfer rates in terms of traces of matrix products, where the elements of the matrices describe the interactions of tangential currents flowing on the surfaces of the interacting material bodies. Using our methods, we obtain new predictions of nonequilibrium phenomena in geometries that would be difficult or impossible to treat using other methods for modeling nonequilibrium fluctuations.

M. T. Homer Reid
Massachusetts Institute of Technology

Date submitted: 09 Nov 2012 Electronic form version 1.4