Physics > Classical Physics

Modeling near-field radiative heat transfer from sharp objects using a general 3d numerical scattering technique

Alexander P. McCauley, M. T. Homer Reid, Matthias Krüger, Steven G. Johnson

(Submitted on 11 Jul 2011 (v1), last revised 18 Jul 2011 (this version, v2))

We examine the non-equilibrium radiative heat transfer between a plate and finite cylinders and cones, making the first accurate theoretical predictions for the total heat transfer and the spatial heat flux profile for three-dimensional compact objects including corners or tips. We find qualitatively different scaling laws for conical shapes at small separations, and in contrast to a flat/slightly-curved object, a sharp cone exhibits a local \emph{minimum} in the spatially resolved heat flux directly below the tip. The method we develop, in which a scattering-theory formulation of thermal transfer is combined with a boundary-element method for computing scattering matrices, can be applied to three-dimensional objects of arbitrary shape.

Comments:	5 pages, 4 figures. Corrected background information in the introduction, results and discussion unchanged
Subjects:	**Classical Physics (physics.class-ph)**; Computational Physics (physics.comp-ph)
Cite as:	**arXiv:1107.2111 [physics.class-ph]**
	(or **arXiv:1107.2111v2 [physics.class-ph]** for this version)

Submission history

From: Alexander McCauley [view email]
[v1] Mon, 11 Jul 2011 18:25:14 GMT (98kb,D)
[v2] Mon, 18 Jul 2011 02:22:17 GMT (98kb,D)

Which authors of this paper are endorsers?