Proceedings of CHT-15
ICHMT International Symposium on Advances in Computational Heat Transfer

May 25-29, 2015, Rutgers University, Piscataway, USA

CHT-15-239

# NEAR-FIELD RADIATIVE TRANSFER BETWEEN TWO UNEQUAL SIZED SPHERES WITH LARGE SIZE DISPARITIES

Karthik Sasihithlu* and Arvind Narayanaswamy**[§]
*Institut d'Optique, CNRS, Univ. Paris-Sud, 2 avenue Augustin Fresnel, 91127 Palaiseau, France.
*Dept. of Mechanical Engineering, Columbia University, New York, USA.
[§]Correspondence author. Email: Arvind.narayanaswamy@columbia.edu

## ABSTRACT

We compute near-field radiative transfer between two spheres of unequal radii $R_1$ and $R_2$ such that $R_2 \leq 40R_1$. For $R_2 = 40R_1$, the smallest gap to which we have been able to compute radiative transfer is $d = 0.016R_1$. To accomplish these computations, we have had to modify existing methods for computing near-field radiative transfer between two spheres in the following ways: (1) exact calculations of coefficients of vector translation theorem are replaced by approximations valid for the limit $d << R_1$, and (2) recursion relations for a normalized form of translation coefficients are derived which enable us to replace computations of spherical Bessel and Hankel functions by computations of ratios of spherical Bessel or spherical Hankel functions. The results are then compared with the predictions of the modified proximity approximation.