Massachusetts Institute of Technology
Department of Mathematics

LUNCH SEMINAR FOR GRADUATE STUDENTS

Monday, December 3, 2012

12:00 - 1:00 PM   Room 2-143

Steven Johnson

(MIT)

"Mathematical formulations of radiative heat transfer"

Abstract

Radiative heat transfer is a familiar fact of everyday life, from feeling warmed by the distant sun to seeing the red glow of hot metal in an electric burner. Although basic descriptions of this phenomenon have been available since Kirchhoff in the 19th century, following work by Newton and many others, understanding heat transfer becomes surprisingly complicated in microscale and nanoscale systems, where separations and geometries are on the scale of the thermal wavelength. As recently as a few years ago, solutions in this regime (even purely computational solutions) were known only for the simplest high-symmetry geometries such as parallel planes or pairs of spheres. This talk will introduce the challenges posed by radiative transport, assuming only basic knowledge of electromagnetism and no knowledge of thermodynamics, and explain new formulations of this problem that exploit connections to reciprocity and equivalence theorems in wave theory.

Followed by pizza in room 2-290