Massachusetts Institute of Technology
Department of Mathematics

LUNCH SEMINAR FOR GRADUATE STUDENTS

MONDAY, APRIL 2, 2012
12:00 - 1:00 PM   ROOM 2-131

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"The Geometric Analysis of Wave Equations"

Abstract

Many of our most successful models of physical phenomena are based on wave (or wave-like) equations. Important examples include Maxwell's equations of electromagnetism, Einstein's equations of general relativity, and Euler's evolution equation for an irrotational fluid. In the 1980s, there was a revolution in our understanding of the behavior of solutions to wave equations. The main new insights, which were unlocked by mathematicians including Fritz John, Sergiu Klainerman, and Demetrios Christodoulou, were all based on the following guiding principles: in order to derive the sharpest possible estimates, one should acquire a deep understanding of the geometry of the domain, the geometry of the target, the geometry of the equations, the geometry of the solutions, and the manner in which these geometries *interact* with the analytic structure of the equations. These geo-analytic methods, which were refined over the ensuing two decades, have played a central role in resolving some of the most important questions in PDE. Furthermore, they continue to play a central role in modern research. In this talk, I will introduce some of the fundamental ideas that lie at the heart of the geo-analytic program for wave equations. I will focus on simple-but-rich examples in which one can explicitly see the interaction of analysis and geometry.

Followed by pizza in room 2-290