

PHYSICAL MATHEMATICS SEMINAR

Qualitative and Symptotic Theory of Detonations

LUIZ M. FARIA

King Abdullah University of Science and Technology
(KAUST)

ABSTRACT:

Shock waves in reactive media possess very rich dynamics: from formation of cells in multiple dimensions to oscillating shock fronts in one dimension. Because of the extreme complexity of the equations of combustion theory, descriptions simpler than the full system of reactive-flow equations are highly desirable. In this talk we present simplified models of detonations, of both *ad hoc* and asymptotic nature, which are capable of capturing the unsteady and multidimensional character of detonation waves. The qualitative theory consists of a nonlocal, forced Burgers' equation, and the asymptotic theory is based on a weakly non-linear asymptotic analysis of the reactive compressible Navier-Stokes equations. We also show, by analysis and numerical simulations, that the asymptotic equations provide good quantitative predictions.

Joint work with: Aslan R. Kasimov (KAUST), Rodolfo R. Rosales (MIT)

TUESDAY, NOVEMBER 18, 2014

2:30 PM

Building E17, Room 122

*Reception following in Building E17, Room 401A
(Math Dept. Common Room)*

<http://math.mit.edu/pms/>