

**Francisco-Javier Sayas**

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will speak on

**A Guided Tour of Retarded Potentials, from Analysis  
to Simulation**

ABSTRACT: Retarded potentials are mathematical descriptions of solutions of the three dimensional wave equation. They can be introduced as superpositions of spherical source or dipolar waves. Their limits (traces) on the surface from which they originate constitute a set of boundary integral operator with formal properties equal to the Calderon projector for strongly elliptic equations. The associated boundary integral operators can be efficiently used to formulate and simulate scattering problems in the space.

I will first explain some approaches to the mathematical analysis of retarded potentials: (a) using Laplace transforms and resolvent estimates; (b) using the theory of evolutionary equations of the second order on Banach spaces; (c) using a first order (in time and space) formulation and semigroup theory. One interesting aspect of all these theoretical approaches is the fact that they miss the dimensional peculiarities of waves and can be used to analyze their much more complicated two-dimensional counterparts.

I will next discuss the idea that Galerkin semidiscretization in space of some of the associated integral equations leads to a shift of the natural transmission conditions satisfied by potentials to exotic transmission conditions. Luckily, this change barely affects the analysis. Finally some examples of full discretization of potentials for scattering problems will be displayed.

MONDAY, OCTOBER 19, 2015

LECTURE AT 4:00 PM

COFFEE, TEA, AND REFRESHMENTS FROM 3:40 PM

ROOM 617, WACHMAN HALL

DEPARTMENT OF MATHEMATICS