



Department of Mathematics
Society of Industry and Applied Mathematics (SIAM)
UH Student Chapter

Mathematics of reflection seismology, theory and practice

Dr. Rami Nammour
Total E & P Research and Technology, USA
Friday, Oct 26, 2012
2-3 pm
Agnes Arnold Hall, Room 10 (in the basement)

Reflection seismology aims at recovering the material properties of the earth from measurements of reflection data recorded at the surface from an acoustic excitation. Since the propagation of acoustic waves in the earth is governed by partial differential equations, the problem is naturally posed as an inverse problem for the coefficients of the partial differential equation.

The mathematics involved in this field spans a wide spectrum of branches. The general theory of partial differential equations, and inverse problems is obviously involved. More surprisingly, the intricacies of defining what part of the material properties is recoverable, and how to produce images of the earth from seismic data, requires concepts from microlocal analysis.

On the practical side, the theoretical study suggests algorithms that can be implemented to solve these problems. To implement these algorithms, it is necessary to devise accurate numerical schemes to solve the wave equation (finite elements, finite difference, discontinuous Galerkin ...). In most cases, the solution of a linear or nonlinear system is involved, requiring techniques from Krylov subspace methods and optimization theory in general.

This talk is an overview of these methodologies, and others, motivated by a specific problem: the linearized inverse problem of reflection seismology. With emphasis on the set of competences that are useful to prepare for a career in the oil and gas industry.

Dr. Rami Nammour is a Research Geophysicist at Total E & P Research & Technology USA, LLC. He received his PhD from Rice University in 2011, under Dr. William Symes.

Pizza will be served 15 minutes prior to the seminar
More info at math.uh.edu/uhsiam