

William Symes (Rice University)

Title: Mathematics of Seismic Imaging

Abstract: Reflection seismology constructs images of the Earth's interior from echoes collected at or near its surface. This technique is one of the highest resolution tools in the geophysicist's toolbox, and is of particular importance to the oil industry. Its development has suggested some beautiful and difficult mathematical and computational problems, solutions of which could have immediate practical impact. These lectures will give a brisk overview of the theory of this subject as it now stands, and point out a variety of research opportunities.

Agenda:

Lecture 1: The reflection seismic experiment, nature of data and of Earth mechanical fields, the acoustic model, linearization and its limitations, geometric optics analysis of the model-data relationship

Lecture 2: The partially linearized inverse problem, extended models, importance of invertibility, geometric optics of extensions, some invertible extensions, "wave equation" imaging.

Lecture 3: Automating the solution of the partially linearized inverse problem, differential semblance, beyond linearization.