Department of Mathematics
University of Houston

Seminar on Computational Mathematics in Oil & Gas Exploration and Imaging

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New 1D-3D inversion method for triaxial induction logging in biaxial anisotropic formation

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1:30 PM – 2:30 PM
Room 646 PGH

Abstract: Due to recent advances in resistivity well logging theory and practice new triaxial induction tools sensitive to resistivity/conductivity anisotropy have been developed. They provide the full tensor of measurements, with three orientations of the transmitting antenna and three orientations of the receiving antennae, which allow inversion for the whole conductivity tensor. We use the new sensitivities of these tools and develop 1D-3D inversion schemes capable to reveal details of highly laminated shale reservoirs. We apply Gauss-Newton minimization scheme. The ability to simulate responses of the new tools to arbitrary anisotropic 3D media is key to their successful application. We examine a new fast 1D electromagnetic modeling method to simulate triaxial logging tool responses. The method is used as a forward engine for a new 1D inversion scheme for anisotropic formation parameters. An important new feature of the modeling method is its ability to model new tool responses to biaxial anisotropic medium, whose anisotropy tensor has up to three different principal values. This feature is particularly useful to evaluate fractured formations.