1003-86-67 **Bogdan G. Nita*** (`bnita@uh.edu`), University of Houston, 617 Science & Research Bldg. 1, Houston, TX 77204-5005, and **Fang Liu** and **Arthur B. Weglein**. *Imaging and inverting for vertically and laterally varying media using an inverse scattering series method.*

The inverse scattering series is presently the only known theory which allows a multidimensional direct inversion of wavefield measurements for the purpose of imaging rapid changes in a medium properties and inverting for those properties at the location of the reflectors. To date focus has been on the detailed understanding of the operations associated with subseries for imaging and inversion for a vertically varying only, acoustic medium and a constant or variable reference medium. But the true power of these methods consists in their ability to handle multidimensional media.

In this talk, we present the first results obtained by considering a vertically and laterally varying actual medium and a constant background. We are going to show the development of the inverse scattering series to the second term in the series (the first non-linear term) and a breakup of this term into terms which achieve the specific tasks of imaging and inversion. The interpretation is backed up by numerical results which show vertical and lateral correction of location and amplitude to occur in accordance with the current interpretation. These results are extremely positive and represent the first concrete numerical indication of multidimensional imaging in the absence of a correct velocity model. (Received July 29, 2004)