Meeting: 1003, Atlanta, Georgia, SS 27A, AMS-SIAM Special Session on Analysis and Applications in Nonlinear Partial Differential Equations, I

1003-41-66 **Bogdan G. Nita*** (bnita@uh.edu), University of Houston, 617 Science & Research Bldg. 1, Houston, TX 77204-5005. *Forward scattering series and Padé approximants for 1D wavefield propagation in an acoustic medium.*

The forward scattering series is an important and useful tool in understanding the relationship between scattering/perturbation theory and non-perturbative methods for constructing solutions to wave equation. When it converges, the series describes the total wavefield everywhere in a given medium as propagations in a reference medium and interactions with point scatterers, hence constructing a mapping between known solutions of wave events and their volume point scatterer description. This mapping was shown to be required by the recently developed techniques for imaging and inversion based on the inverse scattering series.

The forward scattering series for a 1D acoustic medium and a normal incidence planewave was shown to converge for a ratio less than $\sqrt{2}$ between the reference and the actual velocity. Same limited convergence was obtained for a viscoacoustic medium with or without dispersion. In this talk we present an explanation for this divergence and show that, for this model, the sequence of Padé approximations to the partial sums of the forward scattering series converges for any velocity contrast for both acoustic and viscoacoustic cases. Possible extensions and benefits to multi-dimensional wave equation will also be discussed. (Received July 29, 2004)