

# Mathematics Colloquium Speaker

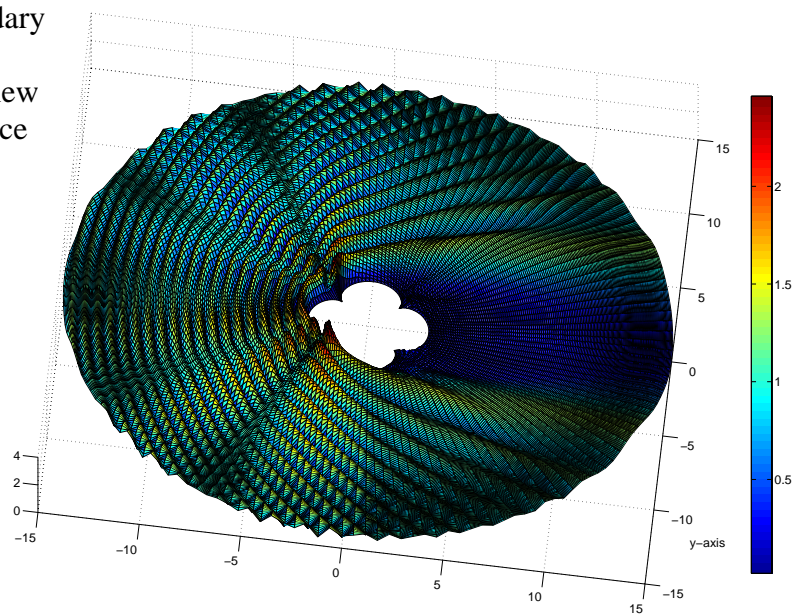
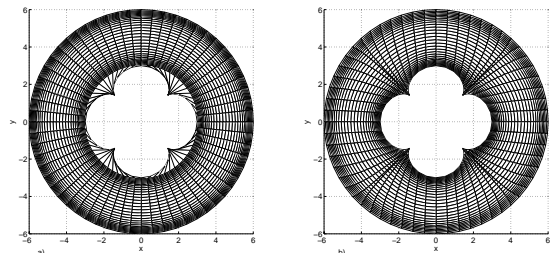


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Thursday, September 28, 2006  
4:00 PM in 1170 TMCB

## Numerical Methods for scattering from complexly shaped obstacles

*Abstract:* The current work sets forth a practical approach to numerically solve two-dimensional direct acoustic scattering problems from complexly shaped scatterers with severe singularities, such as corners and cusps. First, boundary conforming coordinates are generated. This generation is performed through an elliptic grid generator algorithm, including control of the coordinate lines. The grid line control solely depends on the initial distribution of grid points. Following the grid generation process, the initial boundary value problem, modelling the scattering phenomenon, is formulated in terms of the new curvilinear coordinates, and a finite-difference time domain method is implemented. The presence of the boundary singularities causes instability of the numerical method. However, by appropriately controlling the distance between grid lines in the vicinity of these singularities, stability and convergence are achieved. A semi-analytical formula for the differential scattering cross section is obtained from the discrete Fourier transform of the computed scattered pressure field. The method is successfully applied to several interesting scatterers of various shapes.



Vianey Villamizar has been a professor of Mathematics at BYU since 2000. After receiving his BS and MS in mathematics at Universidad Central de Venezuela, he went to Troy, NY where he earned a PhD in applied mathematics at Rensselaer Polytechnic Institute. Subsequently, he acquired a postdoctoral position at Northwestern University for two years before going back to his native land Venezuela. There, he held a permanent position in the Mathematics Department at Universidad Central de Venezuela for over ten years.

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