THE UNIVERSITY of NORTH CAROLINA
GREENSBORO

Department of Mathematics & Statistics

Helen Barton Lecture Series in Mathematical Sciences

Dr. Alfonso Castro

Professor of Mathematics
Harvey Mudd College

Solvability of semilinear boundary value problems with discrete spectrum

Dr. Alfonso Castro is a Professor of Mathematics at Harvey Mudd College, CA. He received his B.S. and M.S. degrees from Colombia, Bogota and PhD from University of Cincinnati, OH in 1977.

Professor Castro is a world renowned expert in the area of Partial Differential Equations. In particular his interest lies in variational methods, inverse problems and water waves (solitons). He has more than 80 articles in reputed journals and supervised 13 PhD students at various institutions. His research, for example, involves understanding the temperature distribution in a star which requires balancing heat diffusion, generation and radiation. In recent years, he has fully classified the radial solutions to this problem. The fundamental nature of his research allows him to involve mathematics majors interested in differential equations in his research program.

He served as the program director of National Science Foundation from 1989 to 1991. He is in the editorial board of many journals. Most notably, he is the Co-founder and Managing Editor of the open access journal *Electronic Journal of Differential Equations*.

Abstract

Semilinear equations with discrete spectrum are present in multiple scientific problems. Problems, methods, and open questions will be presented. First we will consider two point boundary value problems for ordinary differential equations such as those arising in the study of a simple pendulum. Then we will analyze higher dimensional equations with symmetries leading to singular one-dimensional problems. Finally we will see how the presence or absence of compactness impacts the existence of solutions to such equations.

Lecture 1

Monday, August 27th 2012
Reception: Lounge, Petty 120, 3:30-4:00 PM
Lecture: Petty 150, 4:00 PM

This lecture will introduce audience to boundary value problems to energy preserving ordinary differential equations. The role of the asymptotic behavior of the potential energy will be emphasized.

Lecture 2

Wednesday, August 29th 2012
Reception: Lounge, Petty 120, 3:30-4:00 PM
Lecture: Petty 150, 4:00 PM

This lecture will discuss the solvability of boundary value problems for ordinary differential equations where energy is not preserved. Applications to radial solutions to semilinear elliptic boundary value problems will be presented.

Lecture 3

Friday, August 31st, 2012
Reception: Lounge, Petty 120, 3:30-4:00 PM
Lecture: Petty 150, 4:00 PM

The final lecture will be devoted to the effect of compactness, or lack of it, on the existence of solutions boundary value problems.

For more information, please see: http://www.uncg.edu/math/talks/index.html or contact Dr. Maya Chhetri at maya@uncg.edu.