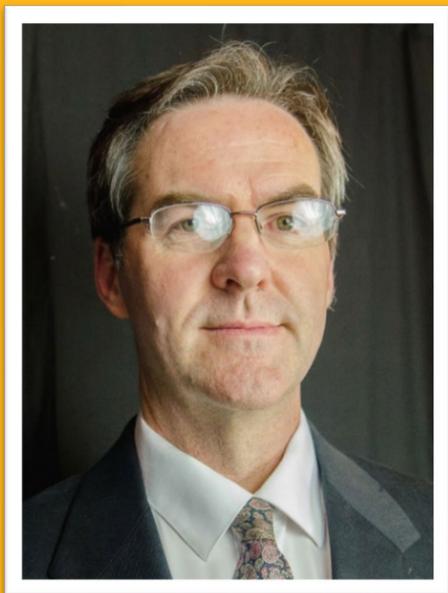


Fall 2019



Stephen Robinson

Stephen Robinson is the Taylor Professor of Mathematics at Wake Forest University. He arrived at Wake Forest in 1991 and has thoroughly enjoyed both the mathematics and the teaching. He has published 40 papers primarily about Nonlinear Analysis applied to Ordinary and Partial Differential Equations. In 2016 he was pleased to receive the Distinguished Teaching Award from the Southeastern Section of the MAA.

Reception · Petty 116
3:30 PM – 4:00 PM

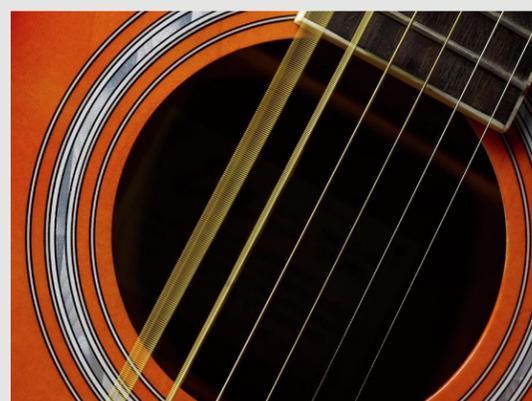
Lecture · Petty 213
Mon. Oct. 21
Wed. Oct. 23
Fri. Oct. 25
4:00 PM – 5:00 PM



Helen Barton Lecture Series Mathematical Sciences

Exploring Resonance and Nonresonance

On one side of a room is a guitar with a standard tuning of E,A,D,G,B,E going from lowest to highest. On the other side of the room is a low E tuning fork. If we strike the fork with a mallet, let it ring, and then observe the guitar, then one can easily see vibrations in the low E string, but almost nothing in the others. This simple experiment demonstrates the phenomena of resonance and nonresonance. This week my goal is to explore resonance and nonresonance using the tools of calculus and linear algebra.



We begin by creating mathematical models that describe vibrating guitar strings under several different conditions. The models include both the continuous (ordinary differential equations) and the discrete (matrix-vector equations). We will also see how these models are related to oscillating suspension bridges such as the famous, and disastrous, Tacoma Narrows Bridge.



We will analyze the models using ideas first developed in calculus and linear algebra courses and later extended to Variational Methods (higher dimensional calculus) and Functional Analysis (higher dimensional linear algebra). The challenges involved in this analysis have motivated some beautiful mathematics both classical and modern. I plan to discuss several examples of central importance and will describe research projects with students, both undergraduate and graduate. Along the way we will also identify open problems worth investigating.

For more information please see mathstats.uncg.edu/events/mathematical-sciences/ or contact Shivaji at shivaji@uncg.edu