

# DEPARTMENT OF MECHANICAL & AEROSPACE ENGINEERING

## WILLIAM MAXWELL REED SEMINAR SERIES

### “Unexpected behavior in nonlinear structural mechanics”

**Lawrie Virgin, Ph.D.**

Duke University

Department of Mechanical Engineering

#### Abstract:

One of the most interesting aspects of nonlinear structural behavior is the occurrence of snap-through. The sudden loss of stability under loading, often leading to an inversion of a curved structure for example, is an event that may be either undesirable or exploited, depending on the situation. Sometimes it occurs in subtle, unexpected ways. Some analytic/experimental verification based on thin plastic strips and 3D-printing is presented. In some cases, usually with very slender components, self-weight due to gravity is an important ‘loading’ device, in others it’s a change in thermal environment. The talk will conclude with a few examples of the beneficial role played by 3D-printing in teaching and nonlinear dynamics.

#### Speaker Bio:



Lawrie Virgin is a professor of mechanical engineering and materials science at Duke University. He is former chair of Duke’s Department of Civil and Environmental Engineering and has been a faculty member at Duke since 1988, prior to which he received his BS from the University of Manchester (UK) and PhD from University College London (UK). Virgin’s research interests are centered on nonlinear mechanics, especially buckling, nonlinear vibration, and their interactions. Applications of his research include ship capsize, aeroelasticity, marine risers, rocking blocks, control, sonic fatigue, solar sails, and the dynamics of slender structures. He has also developed an interest in 3D-printing and especially its use in the teaching of mechanics. He has published over 180 journal papers, and two books: Introduction to Experimental Nonlinear Dynamics (2000), and Vibrations of Axially Loaded Structures (2007), both by Cambridge University Press.

**Date:** Friday, October 27, 2023

**Place:** Whitehall Classroom Building 110

**Time:** 3:00 PM EST

**Contact:** Dr. Jonathan Wenk

Attendance open to all interested persons