

ME DEPARTMENTAL SEMINAR

Friday, October 21, 2005

1:00pm – 2:00pm

2233 GG BROWN

**Professor Balakumar Balachandran
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University of Maryland**

“Oscillations of Micro-Scale Resonators”

Abstract:

Micro-scale resonators are attractive for communication and signal-processing applications. In the resonators considered here, piezoelectric actuation is used to excite the composite structures on the input side and piezoelectric sensing is carried out on the output side. Analytical and numerical efforts being carried out to understand nonlinear phenomena in these resonators as well as to develop design tools for such systems will be presented. In the first component of the talk, it will be discussed as to how linear and nonlinear finite element analyses can be used to study the influence of axial loads, predict buckling, and explain experimental observations. In another component, parametric identification schemes being used to determine residual stresses and linear and nonlinear characteristics of these resonators will be presented. Nonlinear oscillations of clamped-clamped and free-free micro-electromechanical filters will also be addressed, and nonlinear analysis being carried out to explain experimental observations of nonlinear phenomena will be presented. To close the talk, possibilities for intrinsic localized modes in resonator arrays and other work in progress will be discussed.

About the Speaker:

B. Balachandran received his B. Tech (Naval Architecture) in July 1985 from the Indian Institute of Technology, Madras, India, M.S. (Aerospace Engineering) from Virginia Tech, Blacksburg, VA in Dec. 1986 and Ph.D. (Engineering Mechanics) from Virginia Tech in Dec. 1990. Currently, he is a Professor of Mechanical Engineering at the University of Maryland. His research interests include nonlinear dynamics, vibration and acoustics control, system identification, and signal analyses. The publications that he has authored/co-authored include a Wiley textbook entitled “Applied Nonlinear Dynamics: Analytical, Computational, and Experimental Methods” (1995) and a Thomson textbook entitled “Vibrations” (2003). He serves on the editorial board of the Journal of Vibration and Control, is an Associate Editor of the AIAA Journal, and is an Associate Editor of the ASME Journal of Computational and Nonlinear Dynamics. He is a Fellow of ASME.