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**Mechanical, Materials And Aerospace Engineering Department**

**MIDWEST MECHANICS SEMINAR  
WEDNESDAY, April 21, 2004  
E-1 BUILDING – CRAWFORD AUDITORIUM  
3:30 – 4:30 PM**

**Recent Advances in Parametric Excitation**

Professor Richard Rand  
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**Abstract**

Parametric Excitation refers to dynamics problems in which the forcing function enters into the governing differential equation as a variable coefficient. The paradigm example is given by Mathieu's equation:

$$x'' + (d + e \cos t) x = 0.$$

This has application to many engineering systems, the simplest example of which is the vertical forcing of a pendulum. In this lecture, the basics of parametric excitation will be reviewed, and some new results will be presented.

**Biography**

Professor Rand did his Bachelor's work at Cooper Union (1964) and his Master's (1965) and Doctorate (1967) at Columbia University. Since 1967 he has been a professor in Cornell University's Department of Theoretical and Applied Mechanics. He spent Sabbatical leaves in the Departments of Mechanical Engineering at U.C.Berkeley (1982) and U.C.L.A. (1989). He was elected a Fellow of the American Society of Mechanical Engineering in 1995. He is on the editorial board of the Journal of Vibration and Control. He has published more than 100 research papers in the areas of nonlinear dynamics and biomathematics, as well as 3 books on computer algebra and perturbation theory. Current research work involves using perturbation methods and bifurcation theory to obtain approximate solutions to differential equations arising from nonlinear dynamics problems in engineering and biology.