



Dr. R. S. Pandey Distinguished Lecture

Speaker:

Prof. N. N. Kishore

Effect of Initial Perturbations on Stability of Autonomous Bicycle--A Graphical Approach



Date: March 28, 2026, Saturday

Time: 9:15 AM

Venue: L18, LHC

Abstract of the Talk:

The present paper attempts to perform a quasi-dynamic analysis of bicycle stability from the viewpoint of initial perturbations and understand the stable and unstable behaviours. As earlier researchers did, the bicycle is idealized as four interconnected bodies--the front wheel, the front fork, the main body, and the rear wheel, all joined by revolute joints. The forces acting on the bicycle are limited to its weight, centrifugal forces, and gyroscopic moments. The two primary degrees of freedom analyzed are the bicycle's lean (tilt) angle and the front wheel's steering angle. A systematic MATLAB simulation analysis illustrates the results through trajectories, phase plots, and moment contours. This graphical approach helps to identify the effect of small but finite initial perturbations on the stability, offering intuitive insights into the nonlinear dynamics governing self-stability.

About the Speaker:

Prof. N. N. Kishore has been a faculty member at IIT Tirupati in the Dept of Mechanical Engineering since January 2016. Earlier, he worked at IIT Kanpur, as a faculty member for 31 years. He obtained his B.E. from Andhra University in 1971, and his M.Tech. and Ph.D. from the Indian Institute of Technology, Kanpur (Mech. Eng.) in 1974 and 1980, respectively. He worked as a Post Doctoral Fellow at Drexel University, Philadelphia, from 1980-84. He also interacted with the Institute of NDT in Saarbrücken, Germany, on NDT research projects. His major areas of interest are in Wave Mechanics, Composite Materials, Finite Element Methods, Non-Destructive Evaluation, and Dynamic Fracture Mechanics. He guided several Ph.D. students and published technical papers in national and international journals. He served IIT Kanpur in various administrative capacities as Head of the Department of Mechanical Engineering during 2001-04 and as Professor-in-Charge of Administration during 2015.

About the Endowed Lecture Series:

Dr. R.S. Pandey Distinguished Lectures Series is supported by Mr. Rakesh Pandey (BT/ME/1978). Under this lecture series, the Department of Mechanical Engineering, IIT Kanpur organizes a lecture each year by a distinguished person.

Mr. Pandey was the Chief Financial Officer (CFO) of the IITK Foundation till recently. He joined the foundation in 2006 and served as its Secretary from 2006-09. In 2008, he was elected President of the IITK Alumni Association. He is a Distinguished Research Scientist at Olin College of Engineering, Executive-in-Residence at Northeastern University and Mentor at Legatum Center, MIT, USA. His recent work has focused on (a) poverty alleviation through livelihood improvement aided by technical and business innovations and (b) conducting workshops for poor people towards empowering them through collective problem-solving methods. Mr. Pandey had a long tenure at Bose Corporation spanning research, innovation, and product development, business start-up, sales and marketing. He launched and ran Bose's subsidiary in India (1995), started Bose Technology Center in India (2003) and created the Center for University and Industry Research (2008). Mr. Pandey holds a Master's from Penn State University.

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