MECHANICAL, AEROSPACE & BIOMEDICAL ENGINEERING

Distinguished Speaker Seminar:

Structures, Failures, and Lessons

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Abstract

Throughout history failures have taught mankind some very important lessons. It is the engineering community's responsibility to learn from these lessons and ensure that similar failures never happen again so that loss of property and life can be avoided. In this presentation, structural failures from the 19th Century are traced and in each case the lessons that needed to be learnt are identified and highlighted. Some of the failures are failure of large water tanks, a molasses tank failure in Boston in 1919, Tacoma-Narrows bridge failure, Comet airplane accidents, X-33 composite tank failure, etc. While the focus of this presentation is on structures, these failures are generic to all engineering disciplines.

Biography

During the past four decades at NASA Langley Research Center, Dr. Raju's research focused on Fracture Mechanics, Durability and Damage Tolerance, Composite Materials, and development of advanced Structural Analysis Methods. Dr. Raju held various positions such as Branch Head of the Mechanics of Materials Branch in the Materials Division; Branch Head of the Analytical and Computational Methods Branch and Senior Technologist of Structures and Materials; NASA Engineering and Safety Center's (NESC) Structures Discipline Expert; and until recently the NASA Technical Fellow for Structures. During his career, Dr. Raju was called on to participate in four major failure investigations – *7' x 10' fan blade* failure at Langley, *Challenger* SRB field joint, *X-33* Composite tank failure, and the *AA 587* Airbus A300-600 rudder failure. In his current position at the NESC, Dr. Raju's work is focused on evaluations and assessments of various technical problems and to ensure safe operations of the Space Shuttle, the International Space Station programs, the Ares rockets of the Constellation Program, and the Commercial Crew Program. He is the author of over 300 technical publications and presentations in national and international Journals and Conferences. Dr. Raju serves as a Corresponding Editor for the *Computer Modeling in Engineering & Sciences* and as an Executive Editor for the *Structural Longevity* - International Journals. Dr. Raju is the recipient of several honors: NASA Langley's *Value Engineering Award*; ICCES's *Theodore H. H. Pian Medal*; *Fellow* of American Institute of Aeronautics and Astronautics; Fellow of American Society of Mechanical Engineers, NESC's *MLAS Max Faget Engineering Excellence* Award**;** 2009 AIAA Hampton Roads Section *Engineer of the Year*; *2009 Peninsula Engineer of the Year*, Virginia Peninsula Engineering Council; ICCES's Lifetime Achievement Award; NASA's *Exceptional Achievement and Exceptional Service Medals.* Dr. Raju retired from NASA Langley in March 2017. Recently, he took up a Distinguished Research Associate position at Langley in the Durability Damage Tolerance and Reliability branch in the Research Directorate.