DEPARTMENT OF MECHANICAL ENGINEERING
WILLIAM MAXWELL REED SEMINAR SERIES

"Structural Dynamics Challenges of In-Space Modular Assembly and Reconfiguration: Insight from Early Efforts for Future Missions."

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University of Kentucky

Abstract:
This seminar expands on a recent review of 1980s to early 2010s research supporting successful on-orbit assembly and missions of large flexible space structures that was conducted to gather structural dynamics solutions of potential value for researchers facing today's challenges. Research in this period focused on efforts ranging from ground validation via unique hybrid scale dynamic model test beds to development and evaluation of in-space excitation and methods for modal characterization and model adjustment with the Mir space station before its de-orbit. The phased assembly of the International Space Station (ISS), along with its evolving structural loads and dynamics, provides the central example, while ground and on-orbit tests of other systems provided contributing and contrasting approaches and results. For the ISS, these efforts have been instrumental in the ISS structural life evaluation, extending the original 15-yr life of ISS to certification until 2028 (30 years). The unique test articles and experiment sequences developed for these efforts also enabled phenomenological understanding of vibration-based damage detection, potential nonlinear modal interactions and ultralightweight/inflatable spacecraft structures deployment that will be included in the talk, along with connections to current and future system concepts.

Speaker Bio:
Dr. Suzanne Weaver Smith began her career working in aeronautics and space R&D at Harris Corporation in 1980 with launch vibration modeling and testing of the Fine Guidance Electronics of the Hubble Space Telescope. There she also led integration and cross-country mobility testing of the ground communications systems of one of the first U.S. DoD uncrewed aircraft systems (UAS). Her PhD (Virginia Tech ESM, 1988) focused on vibration-based damage location for the International Space Station. Dr. Smith joined the University of Kentucky (UK) faculty in 1990. Over 30 years at UK, Dr. Smith has led a diverse research portfolio that includes the early projects contributing to this seminar and more recent applications of UAS for precision meteorology (CLOUD-MAP, WINDMAP, and FOGMAP) and heritage science (EduceLab). Dr. Smith is also Emeritus Director of the NASA Kentucky Space Grant and EPSCoR Programs. Her accomplishments and impact led to recognition as a National Science Foundation Young Investigator, UK college and university awards for exceptional education, induction into the 2019 Kentucky Aviation Hall of Fame, and selection as a 2020 Fellow of the American Institute of Aeronautics and Astronautics (AIAA).

Date: Friday, April 15, 2022
Time: 3:00 PM EST
Place: Whitehall Classroom Building 110
Contact: Dr. Alexandre Martin 257-4462

Attendance open to all interested persons

College of Engineering

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