Professor Satchi Venkataraman

See:
http://attila.sdsu.edu/~satchi
http://aerospace.sdsu.edu/satchi.html
http://imechanica.org/user/2985
http://www.pdfcari.com/Satchi-Venkataraman,-Ph.-D..html

Department of Aerospace Engineering and Engineering Mechanics
San Diego State University

Education:
B.E, Mechanical Engineering, Anna University, 1991.
M.S., Mechanical Engineering, Clemson University, 1993.
Ph.D., Engineering Mechanics, University of Florida, 1999.

Honors and Awards:
2006 Outstanding Faculty Award, Department of Aerospace Engineering, San Diego State University.
Outstanding International Student Academic Achievement Award, College of Engineering, University of Florida, April 1997

Selected Publications:

Salas P., and Venkataraman S., 2007. Controlling failure using structural fuses for predictable progressive failure of composite laminates, (to appear in Structural and Multidisciplinary Optimization).

Venkataraman S., and Salas P., 2007. Optimization of Composite Laminates for Robust and Predictable Progressive Failure Response, (to appear in AIAA Journal).

Venkataraman, S., Sirimamilla, RR., Nagpal V., Strack B., and Pai SS., 2007. Calculating Confidence Bounds for Reliability Index to Quantify Effect of Distribution Parameter Uncertainty, AIAA Paper AIAA-2007-1940.

Venkataraman, S, 2006. Reliability optimization using probabilistic sufficiency factor and correction response surface, Engineering Optimization, 38 (6), 671-685.

Venkataraman, S., Lamberti, L., Haftka, R. T., and Johnson, T. F., 2003. Challenges in comparing numerical solutions for optimum weights of stiffened shells, Journal of Spacecraft and Rockets, 40 183-192.

Venkataraman, S., Haftka, R.T., and Rapoff, A.J., 2003. Structural Optimization Using Biological Variables to Understand How Bones Design Holes, Structural & Multidisciplinary Optimization, 25 (1), 19-34.

Venkataraman S and Haftka RT., **"Optimization of composite panels – a review"**, In: Proceedings of the 14th annual technical conference of the American society of composites, Dayton OH; 1999. pp. 479–488

1999 PhD Dissertation:

Satchithanandam Venkataraman, "Modeling, analysis and optimization of cylindrical stiffened panels for reusable launch vehicle structures", PhD Dissertation, University of Florida, December, 1999

ABSTRACT: The design of reusable launch vehicles is driven by the need for minimum weight structures. Preliminary design of reusable launch vehicles requires many optimizations to select among competing structural concepts. Accurate models and analysis methods are required for such structural optimizations. Model, analysis, and optimization complexities have to be compromised to meet constraints on design cycle time and computational resources. Stiffened panels used in reusable launch vehicle tanks exhibit complex buckling failure modes. Using detailed finite element models for buckling analysis is too expensive for optimization. Many approximate models and analysis methods have been developed for design of stiffened panels. This dissertation investigates the use of approximate models and analysis methods implemented in PANDA2 software for preliminary design of stiffened panels. PANDA2 is also used for a trade study to compare weight efficiencies of stiffened panel concepts for a liquid hydrogen tank of a reusable launch vehicle. Optimum weights of stiffened panels are obtained for different materials, constructions and stiffener geometry. The study investigates the influence of modeling and analysis choices in PANDA2 on optimum designs. Complex structures usually require finite element analysis models to capture the details of their response. Design of complex structures must account for failure modes that are both global and local in nature. Often, different analysis models or computer programs are employed to calculate global and local structural response. Integration of different analysis programs is cumbersome and computationally expensive. Response surface approximation provides a global polynomial approximation that filters numerical noise present in discretized analysis models. The computational costs are transferred from optimization to development of approximate models. Using this process, the analyst can create structural response models that can be used by designers in optimization. It allows easy integration of analysis models in optimization. The dissertation investigates use of response surface approximations for integrating structural response obtained from a global analysis in the local optimization of stiffened panels. In addition, response surfaces are used for correcting structural response predictions from a low fidelity model with a few expensive detailed finite element analyses.

Research and Teaching Interests:

Dr. Venkataraman's expertise is in the area of structural optimization. His recent work has investigated progressive failure predictability of composite laminates. He has published papers on identification of factors affecting failure predictability and use of surrogate measures to improve robustness and failure predictability (Venkataraman and Salas, 2007), use of structural fuses to control failure and improve robustness and failure predictability (Salas and Venkataraman, 2007), investigation of effect of model uncertainties in progressive failure predictability (Salas and Venkataraman, 2006), and effect of load redistributions and competing failures in progressive failure of redundant truss structures (Marhadi and Venkataraman, 2006).

His previous work has investigated optimal design of shell structures having initial geometric imperfections (Venkataraman et al, 2003 , Lamberti et al 2003), use of approximate surrogate models for efficient design space exploration and reliability based design optimization (Venkataraman, S. 2005 ; Qu et al. 2003), biomimetic design of holes for reduced stress concentration (Venkataraman et al, 2003 and Huang et al. 2003), analysis of structures with functionally graded materials Venkataraman and Sankar 2003), design of thermal protection systems with functionally graded metal foams for thermal insulations in launch vehicle thermal protection systems (Venkataraman et al, 2004 , Zhu et al, 2004), developing efficient global-local design optimization methods for aircraft structures and calculating confidence intervals for reliability estimates based on the uncertainty in the statistical variables (Venkataraman et al, 2006, 2007).