



Mark C. Stabb, Ph.D., P.E.

Expertise

Dr. Stabb's expertise is static, dynamic, thermal, and aeroelastic analysis of mechanical systems. He has a strong background in using NASTRAN and I-DEAS for special purpose and large scale analyses. He also has experience in analysis driven design.



Education

University of Wisconsin - Madison, Madison, WI
Doctorate of Philosophy in Engineering Mechanics, 1992

University of Wisconsin - Madison, Madison, WI
Master of Science Degree in Engineering Mechanics, 1988

University of Wisconsin - Madison, Madison, WI
Bachelor of Science Degree in Applied Math and Physics, 1987

Business Experience

Quartus Engineering Incorporated, San Diego, CA
1997 to present

Co-founder and President of Quartus Engineering Incorporated. Project engineer and registered P.E. supporting a wide variety of customer projects involving static, dynamic and thermal analysis, component and/or system design and redesign, and fatigue analysis.

Structural Dynamics Research Corporation (SDRC), San Diego, CA
1993 through 1997

Project Engineer with SDRC Advanced Test and Analysis Division. Worked primarily with the Aerospace Projects group in areas of finite element modeling and analysis for structural and thermal problems, coupled loads analysis, pre and post-test analysis, aeroelastic flutter, and nonlinear simulations. Work involved using a variety of state-of-the-art CAE software products including NASTRAN, I-DEAS, and MATLAB as well as custom programming in C and FORTRAN. Assisted clients with implementing I-DEAS software within their organization and/or to address their specific design, analysis, or custom software needs.

**University of Wisconsin Department of Engineering Mechanics, Madison, WI
1990 through 1992**

Teaching Assistant for undergraduate Dynamics, Statics and Strength of Materials courses. Responsibilities included preparing and presenting daily lectures, conducting office hours, and preparing and grading homework and tests.

**Orbital Technologies, Inc., Madison, WI
1989**

Engineer. Worked on finite element modeling of a zero-G materials processing experiment designed to fly on the Space Shuttle. Conducted heat and gas flow analysis using computational, analytical, and experimental methods. Supported proposal preparation for SBIR contract work.

Product Experience

Spacecraft. Performed transient analyses for a variety of satellites including ORBCOMM, Iridium, numerous Air Force and NASA small payloads, and Shuttle payload experiments. Used concurrent engineering methods to design and analyze the battery module for the GPS-IIF spacecraft. Performed stress and modal analysis for a number of components on JPL spacecraft.

Launch Vehicles. Developed detailed finite element models of Pegasus XL, and X-34 launch vehicles. Conducted numerous coupled loads analyses for a variety of launch vehicles including STS, Pegasus, Pegasus XL, Taurus, and Sandia STARS.

Avionics Structures. Modeled and performed analysis on F-15 digital map system to aid in weight reduction redesign process. Performed detailed analysis on CRT tube to resolve manufacturing problems leading to fewer defective units. Aided in the analysis of the Airborne Laser (ABL) optical system. Performed conceptual design of avionics display unit based on thermal requirements. Performed dynamic analysis of LCD panel display in order to ruggedize a commercial product for military application. Performed thermal analysis of avionics structure utilizing airflow coldwalls for primary cooling.

Entertainment Industry. Performed structural and thermal analysis of large amusement park structure. Performed detailed stress analysis of a number of components of amusement park rides, and aided in analysis driven redesign of portions of the structure. Planned and ran a dynamic strain gage test on an existing ride. Analyzed test data to aid in prediction of failure mechanisms. Verified structural integrity of ride systems according to DIN 4112 and 15018.

Industrial Equipment. Performed detailed stress analysis of semi-conductor fabrication equipment, including hoist, frame, and mounting hardware.

Consumer Products. Performed detailed analysis and design of numerous components for commercial gas separation systems. Aided in analysis of read/write head vibration for mass storage device used in personal computers.

Thermal Electronic Systems. Experienced with Maya's thermal modeling packages Thermal Model Generator (TMG) and Electronic Systems Cooling (ESC) on a variety of projects. Modeled and analyzed thermal behavior of F/A-18 laser targeting pod. Performed thermal cooling analysis on backlit LCD display units and VME circuit cards for avionics applications. Performed cooling design and analysis of a network controller hardware box. Performed conceptual design of avionics display unit based on thermal requirements. Performed thermal analysis of avionics structure utilizing airflow coldwalls for primary cooling. Performed thermal analysis and aided in design of cooling system for unmanned underwater vehicle. Analyzed and specified cooling requirements for prototype radar system.

Aeroelastic Flutter. Performed a full vehicle flutter analysis of the ITALD missile including development of the aeroelastic model. Performed flutter analysis of the Pegasus XL launch vehicle including panel flutter. Performed fin flutter redesign for Pegasus XL launch vehicle. Supported model development for Gulfstream G-V aircraft. Performed flutter analysis for Northrop BQM-74F target vehicle.

Training. Taught numerous classes in the use of SDRC I-DEAS software for structural and thermal analysis. Developed complete set of course material for training new users to operate SDRC I-DEAS finite element software. Prepared and taught courses in the use of NX NASTRAN for dynamic analysis in the aerospace industry.

Software Development. Aided in the development of commercial program to assist correlation procedures (SDRC CORDS). Written numerous custom C and FORTRAN programs to aid in the processing and calculation of a variety of engineering data. Aided in the development and programming of the MSC/NASTRAN bulk data reader for SDRC I-DEAS.

Pretest Support. Developed MATLAB based toolbox to aid in the implementation of a wide variety of accelerometer location selection algorithms. Methods developed used genetic algorithms to supplement and improve upon existing methods and modified current methods to improve results and increase speed.

Test/Analysis Correlation. Aided in the development and programming of the design sensitivity analysis software (SDRC CORDS). Performed test/analysis correlation for Gulfstream G-V aircraft, Telstar 7000 satellite, Brunswick ITALD vehicle, Iridium satellite, and Pegasus XL launch vehicle simulator.

Aerospace Pressure Vessels. Analyzed and aided in the design of low weight, high pressure tanks designed for use in launch vehicle and payload applications.

NASTRAN. Implemented techniques for applying Hruda-Benfield coupled damping and internal loads data recovery for multi-level superelement models in MSC.NASTRAN. Developed complete set of DMAP alters for customized loads analyses in UAI/NASTRAN substructures.

Deployable Space Structure. Analyzed photovoltaic array deployment buckling for the space station using EASY-5, I-DEAS and custom FORTRAN code.

Skills

- Design: I-DEAS Master Series
- Analysis: NASTRAN, I-DEAS Master Series, VisualNASTRAN 4D, FEMAP
- Simulation/math: Matlab, MathCAD
- Programming: C/C++, FORTRAN, EMACS
- Office Automation: MS Word, MS Excel, MS PowerPoint

Awards

- Concurrent Engineering Award for 1996 from Machine Design Magazine
- National Science Foundation Fellow (NSF)

Affiliations

- Registered Professional Engineer (P.E.) in Mechanical Engineering in the State of California.
- Senior member, American Institute for Aeronautics and Astronautics (AIAA)
- Member, American Society of Mechanical Engineers (ASME)

Publications

Clayton, E.H., Kennel, M.B., Fasel T.R., Todd, M.D., Stabb, M.C., Arritt, B.J., "Active Ultrasonic Joint Integrity Adjudication for Real-time Structural Health Monitoring," Proceedings of the 15th SPIE Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring, San Diego, California, March 9-13, 2008.

Fasel, T.R., Kennel, M.B., Todd, M.D., Clayton, E.H., Stabb, M.C., Park, G., "Bolted Joint Damage Assessment Using Chaotic Probes," Proceedings of the 26th International Modal Analysis Conference (IMAC XXVI), Orlando, Florida, February 4-7, 2008.

B. J. Arritt, S. J. Buckley, J. M. Ganley, A. Kumar, E. H. Clayton, R. Hannum, M. D. Todd, M. B. Kennel, J. Welsh, S. Beard, M. C. Stabb, Q. Xinlin, P. Wegner, "Responsive Satellites and the Need for Structural Health Monitoring," 6th International Workshop on Structural Health Monitoring, Stanford, CA, September 11 - 13, 2007

Flanigan, C.C., and Stabb, M.C., "An Assessment of MSC.NASTRAN Residual Vector Methodology for Dynamic Loads Analysis," 18th International Modal Analysis Conference, San Antonio, Texas, February 7-10, 2000.

Flanigan, C.C., and Stabb, M. C., "Aeroelastic Design and Analysis of Winged Launch Vehicles," AIAA 96-1230, AIAA Dynamics Specialists Conference, Salt Lake City, Utah, April 18-19, 1996.

Stabb, M. C., Brillhart, R., Flanigan, C. C., Pinkham, R., "Aeroelastic Analysis and Test of the Pegasus XL Launch Vehicle," 16th Aerospace Testing Seminar, Manhattan Beach, California, March 12-14, 1996.

Brillhart, R., Hensley, D., Stabb, M. C., Pinkham, R., "Pegasus XL Fin Dynamic Characterization for Flutter Evaluation," 14th SEM International Modal Analysis Conference, Dearborn, Michigan, February 12-15, 1996.

Flanigan, C. C., Stabb, M. C., "Comparison of Automated Methods for Optimum Accelerometer Selection," 14th SEM International Modal Analysis Conference, Dearborn, Michigan, February 12-15, 1996.

Mazzoleni, A. P., Hall, C. D., Stabb, M. C., "Double Averaging Approach to the Study of Spinup Dynamics of Flexible Satellites," Journal of Guidance, Control and Dynamics, Vol. 19, No. 1, 1996, pp. 54-59.

Stabb, M. C., Blesloch, P. A., "Application of Flexibility Shapes to Sensor Selection," 13th SEM International Modal Analysis Conference, Nashville, Tennessee, February 13-16, 1995.

Stabb, M. C., Blesloch, P. A., "A Genetic Algorithm for Optimally Selecting Accelerometer Locations," 13th SEM International Modal Analysis Conference, Nashville, Tennessee, February 13-16, 1995.

Blesloch, P. A., Stabb, M. C., "Selecting Accelerometer Locations Using Flexibility Shapes," SAVAIC Shock and Vibration Symposium, pp. 253-261, San Diego, California, October 31- November 3, 1994.

Stabb, M. C., Gray G. L., "Chaos in Controlled, Gravity Gradient Satellite Pitch Dynamics via the Method of Melnikov - Saddle Stabilization," AIAA Dynamics Specialists Conference, Paper AIAA 94-1671, Hilton Head, South Carolina, April 21-22, 1994.

Mazzoleni, A. P., Hall, C. D., Stabb, M. C., "Spinup Dynamics of Dual-Spin Satellites with Flexible Appendages," AAS/AIAA Spaceflight Mechanics Meeting, Paper AAS 94-147, Cocoa Beach, Florida, February 14-16, 1994.

Stabb, M. C., A. L. Schlack, "The Influence of Appendage Vibration on the Pointing Accuracy of a Dual-Spin Satellite," Proceedings of the 1993 AAS/AIAA Spaceflight Mechanics Meeting, Paper AAS 93-116, Pasadena, California, February 22-24, 1993.

Gray, G. L., M. C. Stabb, "Chaos in Controlled, Gravity Gradient Satellite Pitch Dynamics via the Method of Melnikov, Part I - Center Stabilization," AAS/AIAA Spaceflight Mechanics Meeting, Paper AAS 93-132, Pasadena, California, February 22-24, 1993.

Stabb, M. C., A. L. Schlack, "Pointing Accuracy of a Dual-Spin Satellite due to Torsional Appendage Vibration," Journal of Guidance, Control and Dynamics, Vol. 16, No. 4, 1993, pp. 630-635.

Last updated on June 17, 2008

