



## UNIVERSITY RESEARCH EXPERIENCE

*Department of Mechanical Engineering, Seattle University*  
**Associate Professor**, January 2001 to Present

*Department of Engineering Mechanics, University of Wisconsin - Madison*  
**Research Assistant**, January 1989 to October 1991

Dissertation research related to the development and implementation of thermodynamically consistent constitutive models for polymeric materials. This work involved not only the theoretical development of the governing equations, but also the implementation of a finite element code to analyze model systems and compare with experimental results.

*Department of Engineering Mechanics, University of Wisconsin - Madison*  
**Research Assistant**, September 1986 to August 1987

This research studied procedures for improving peak stress estimates in the vicinity of stress concentrations. The procedures developed provide improved estimates of peak stresses with lower order elements than are normally required. The method also improves the strain energy release rate estimate required for fracture mechanics analyses.

*Department of Civil Engineering, University of Texas - Austin*  
**Research Assistant**, June 1977 to May 1979

The goal of this project was the development of pre- and post-processing programs for the analysis of skewed highway bridges. The finite difference method was used to analyze bridge systems for a variety of service loads.

Thesis research related to the implementation and testing of various modal-superposition methods for the analysis of dynamic systems. The results of this research clearly indicated the superiority of the mode-acceleration method in dynamic analyses.

## INDUSTRY EXPERIENCE

*The Boeing Company, Seattle, Washington*  
**Senior Specialist Engineer**, November 1991 to January 2001

Chairman of the Technical Team of the National Airport Pavement Test Program. The purpose of the national test program is to quantify the impact of heavy landing gear loads on the response of both flexible and rigid pavements. As new gear configurations are developed, the traditional methods of accounting for the interaction of the landing gear and pavement are being stretched to the limit. This ongoing program will review existing pavement design methods and develop data to extend them to encompass a wider range of loading situations.

Directed a four year test program to study the performance of Boeing's 777 landing gear design on flexible pavements. This research was conducted at the facilities of Progresstech Ltd. in Moscow, Russian Federation. The program studied static, dynamic and trafficking aspects of gear/pavement interaction and was a precursor to the current work being done by the National Airport Pavement Test Program.

Led the development of a test program to improve scaling methods for carbon fiber reinforced composites. The goal of this program was the prediction of the ultimate strength of full scale composite systems based upon the testing of scale models.

Developed a procedure to compute the shear stress distribution on arbitrary cross-sections of curved beams subjected to torsion loads. No published method currently exists, except finite element analysis, to predict shear stresses in these situations.

Provided technical consulting services for the ANSYS and NASTRAN programs used throughout Boeing to conduct finite element analyses.

*Dewberry and Davis, Fairfax, Virginia*

**Engineering Applications Manager**, August 1985 to August 1986

Responsible for providing engineering support to the technical professionals throughout the 1200 person firm. A major accomplishment was the development and initiation of plans to integrate the land developments engineering and CAD operations.

*Exxon Production Research Company, Houston, Texas*

**Senior Research Engineer**, June 1979 to August 1984

Responsible for conducting studies concerning the response of structural systems subjected to environmental loads. Duties divided between applied research (50%) and technical consulting (50%).

Conducted a study focusing on the interaction of member behavior and overall system reliability. As a result of this study, a program was developed to conduct collapse analyses of offshore platforms accounting for the nonlinear load-deformation response of the structural members.

Directed development of a set of programs to select both the structural geometry and member sizes for offshore platforms which result in a least weight structural system to resist environmental loads.

Developed and implemented software for the analysis and design of offshore platforms in earthquake environments. This work directly impacted the recommendations of the American Petroleum Institute's committee on earthquake design procedures.

Participated in the development of earthquake design criteria for platforms to be installed offshore of California. The procedures developed during this project were then implemented by several oil companies.

## **PUBLICATIONS**

### **Refereed Journal Papers**

Cornwell R. E., "Computation of Load Factors in Bolted Connections," *Proceeding of the Institution of Mechanical Engineers Part C: Journal of Mechanical Engineering Science*, accepted for publication on August 27, 2008.

Cornwell R. E., "Stress Concentration Factors for the Torsion of Curved Beams of Arbitrary Cross Section," *Proceeding of the Institution of Mechanical Engineers Part C: Journal of Mechanical Engineering Science*, Volume 220, Number 12, 2006, pp. 1709-1726.

Mason G. and Cornwell R. E., "A C++ Programming Shell to Simplify GUI Development in a Numerical Methods Course," *Computers in Education Journal*, Number 2, April - June 2007.

Cornwell R. E. and Malkus D. S., "Improved Numerical Dissipation for Time Integration Algorithms in Conduction Heat Transfer," *Computer Methods in Applied Mechanics and Engineering*, **97**, 149-156, 1992.

Cornwell R. E. and Cook R. D., "Improvement in Peak Stress Estimates Through Post-Processing," *Finite Elements in Analysis and Design*, **4**, 203-208, 1988.

Cornwell R. E., Craig R. R. and Johnson C. P., "On the Applicability of the Mode-Acceleration Method to Structural Engineering Problems," *Earthquake Engineering and Structural Dynamics*, **11**, 679-688, 1983.

### **Refereed Conference Papers**

Hayhoe G. F., Cornwell R. E., Garg N., "Slow-Rolling Response Tests on the Test Pavements at the National Airport Pavement Test Facility (NAPTF)," *Advancing Airfield Pavements: Proceedings of the 2001 Airfield Pavement Specialty Conference, Chicago, Illinois*, 30-44, 2001.

Cornwell R. E., "Boeing 777 Pavement Load Tests," *3<sup>rd</sup> International Conference on Road and Airfield Pavement Technology - Beijing, China*, **2**, 1375-1383, 1998.