

# **JAMES E. HORWEDEL**

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## **QUALIFICATIONS:**

Skilled computer programmer with twenty-seven years computing experience in a wide range of scientific applications. Expertise with a variety of software including Visual C++, C++, C, FORTRAN, UNIX, ACIS, OPENGL, and PERL. Have implemented software on a variety of platforms including: Windows 98, Windows NT, Windows 2000, Windows XP, and most UNIX platforms. Areas of expertise include automated sensitivity analysis using computer calculus, 2- and 3-dimensional visualization, and user interfaces.

## **PROFESSIONAL EXPERIENCE:**

Oak Ridge National Laboratory

**September 2000–present.** On going work involves the development and maintenance of several graphical user interface programs that provide a "user friendly" interface to a variety of calculational sequences available with the SCALE code system. SCALE is used worldwide for evaluation of criticality safety, radiation shielding, heat transfer, and source-term characterization of nuclear facilities and transport/storage packages.

**August 1996–present R&D Research Staff.** Developed a three-dimensional color graphics program for interactively displaying input data to the KENO-V.a and KENO VI Monte Carlo Criticality programs. The Keno3d viewer, written in Visual C++, provides an interface between KENO and the ACIS 3-D Toolkit. Major research effort includes the development and implementation of algorithms for extending the size of problems that can be displayed.

**June 1994 - August 1996 R&D Research Staff.** Participating in several World Wide Web (WWW) applications, including: developing and maintaining new user information for the ORNL Center for Computational Sciences (CCS); creating a WAIS searchable database for the CCS Software Inventory; writing Perl scripts and creating forms for interfacing with WWW users; and, providing technical support to others attempting to implement forms, C programs and CGI-BIN scripts on the WWW.

**January 1985 - June 1994 R&D Computer Specialist.** Recognized for work in developing the Gradient Enhanced Software System (GRESS) used to automate the analytic calculation of derivatives and sensitivities in existing FORTRAN 77 computer models. Responsibilities include the development, implementation, and application of GRESS to calculate sensitivities of model results to model parameters in a variety of FORTRAN 77 computer models. Received a Significant Event Award for reducing the personnel time to process a model with GRESS from three man-months to less than one week.

**January 1982 - December 1984 Project Leader, Energy and Environmental Modeling.**

Duties included providing operational support to Department of Energy Fossil Fuels Division and the Energy Information Agency in the development, validation, and verification of several energy economic models. Also, participated in a team effort to develop programs for interfacing with a product certification database at Y-12.

**October 1978 - May 1982 Computing Analyst.** Developed and implemented a numerical approach to adjoint sensitivity theory as applied to a major energy-economic model reducing computer resource requirements by more than a factor of 10. Implemented several comprehensive models of the domestic liquid and gaseous fuels supply market and corresponding databases. Received a Significant Event Award for successfully implementing the numerical approach to adjoint sensitivity theory in a timely fashion.

## **EDUCATION:**

**M. A. Science Education (1975)**, University of New Mexico, Albuquerque, New Mexico.

**B. A. Physics and Mathematics (1972)**, Cum Laude with Honors in Math and Physics, University of LaVerne, LaVerne, California

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## **PUBLICATIONS -- 1989-1999**

J. E. Horwedel, "Reverse Automatic Differentiation of Modular FORTRAN Programs," *Workshop Report on First Theory Institute on Computational Differentiation*, held at Argonne National Laboratory May 24- 26, p. 23-27, ANL/MCS-TM-183 (December 1993). (**Invited**)

J. E. Horwedel, *Reverse Automatic Differentiation of Modular FORTRAN Programs*, ORNL/TM-12050 (1992).

J. E. Horwedel, R.J. Raridon, and R. Q. Wright, "Automated Sensitivity Analysis of an Atmospheric Dispersion Model," *Atmospheric Environment* Vol 26A, No. 9, pp. 1643-1649, 1992 (printed in Great Britain).

J. E. Horwedel, *GRESS Version 2.0 User's Manual*, ORNL/TM-11951 (1991).

J. E. Horwedel, R. Q. Wright, and R. E. Maerker, *Sensitivity Analysis of EQ3*, ORNL/TM-11407, Martin Marietta Energy Systems, Inc., Oak Ridge Natl. Lab. (1990).

J. E. Horwedel, "GRESS, A Preprocessor for Sensitivity Studies of Fortran Programs," *Proc. of SIAM Workshop on Automatic Differentiation of Algorithms: Theory, Implementation, and Application*, Breckenridge, Colorado, January 6-8, 1991, p. 243-250 (1991). (**Invited**)

J. E. Horwedel, R. J. Raridon, and R. Q. Wright, *Sensitivity Analysis of AIRDOS-EPA Using ADGEN With Matrix Reduction Algorithms*, ORNL/TM-11373, Martin Marietta Energy Systems, Inc., Oak Ridge Natl. Lab. (1989).

J. E. Horwedel, *Matrix Reduction Algorithms for GRESS and ADGEN*, ORNL/TM-11261 (November 1989).