

# JAMES D. MILLER

## EDUCATION

M.S. Mechanical Engineering, 1981

M.S. Physics, 1980

University of Michigan, Ann Arbor, Michigan

Fellowship awarded

B.S. Physics, 1978

University of Minnesota, Minneapolis

High distinction graduation honors, Tau Beta Pi, Phi Beta Kappa

## SKILLS

- COMPUTERS AND SOFTWARE:

Visual Basic, VBA, VBScript, VB.net, JavaScript, SQL, Perl, Python, Fortran, Pascal, C  
ArcIMS (ESRI GIS), ASP (Active Server Pages), InterDev, Visual Studio.net, ChartFX, FrontPage,  
MS-Access, Excel, S-plus, R, Win2000 Server, Unix

- DISCIPLINES:

Building science and HVAC systems / Thermofluids  
Experimentation / field-monitoring instrumentation / data analysis / statistics  
GIS (Geographic Information Systems)  
Fluid velocity measurement technology: LDV, HWA, and PIV  
Optics / fiber optics / lasers / image processing / ray tracing software  
Technical writing / teaching / presentations / working with customers

## EXPERIENCE

1/10 - Present SENIOR ENERGY EFFICIENCY ENGINEER, Pacific Northwest National Laboratory  
(Battelle PNNL), Technology Planning and Deployment

7/05 - Present ADJUNCT INSTRUCTOR OF PHYSICS / LAB MANAGER, Gustavus Adolphus  
College

7/92 - 7/05 Pacific Northwest National Laboratory (Battelle PNNL), Technology Systems Analysis

Internet Applications / Software / Databases (1999 – 2005, 2010 - present):  
ENGINEERING ASSOCIATE

Developed internet-based applications (real-time controls, reports and queries, charting, engineering algorithms) in support of energy-related databases, building systems and controls, data collection processes, and equipment simulators. Coded dynamic content using server-sided ASP (VBScript) and client-sided JavaScript (using Visual Studio / InterDev). Served applications using IIS of Windows 2000 Server. Developed executables and Windows services in VB and VB.Net to facilitate automated feeding of databases and to monitor and resolve server and data process status issues. Projects include: GIS map server and application for federal facilities; unified interface to corporate facilities performance databases; real-time stack emissions monitoring; residential building standards compliance evaluator; air conditioner simulator and calculator; real-time building systems load-shedding controller and viewer; power industry activities database application.

Developed database tools for managing and tracking energy, services, and costs associated with facilities operation (150 buildings) at Battelle PNNL. Implemented through a multi-user front-end plotting/reporting tool for building managers, a front-end data-processing tool for administrators, and a back-end relational database. Tools were developed in Microsoft Access. Used Microsoft VBA and SQL in developing custom plotting, user-controlled queries, and data transformation techniques. Worked with customers to determine requirements and produce design documentation. Developed a context-sensitive compiled help system.

Developed internet application for dynamic graphical display of telemetry (weather) data. Wrote and scheduled Perl scripts to glean/parse data from various web sites and feed a live database. Designed a

web-based graphical viewer to the database using ASP and COM based charting software. Incorporated ODBC, ADO, VBScript, and IIS on Win2000 Server.

Energy Research (1992 – 1999):  
SENIOR RESEARCH ENGINEER

Conducted field-based performance assessments of energy and water conservation measures. Compared thermal and economic performance of new and existing technologies. Designed data-acquisition protocols and executed monitoring studies. Optimized sampling methods. Combined deterministic and statistical methods to analyze the impact of in-use operating conditions. Performed time-series, inference, and regression analysis. Projects include: New York City public housing refrigerator replacement program, ground source heat pump evaluation at Forts Bragg and Hunter, the York Triathlon gas-engine heat pump evaluation at Fort Sam Houston, and the Grant County (WA) irrigation-scheduling project.

Performed analytic studies of HVAC system components. Developed HVAC system simulations and regional aggregation methodologies to quantify the interactions between equipment, climate, buildings, and loads. Analyzed thermal and cost performance for selecting new technologies. Projects include: Commercial equipment standards for air conditioners, furnaces, and boilers; standards for residential duct insulation, study of ventilation systems for manufactured houses; estimates of commercial HVAC distribution energy.

Provided consulting support on the application of laser Doppler velocimetry (LDV) systems in making measurements of fluid velocity. Investigated oscillating-jet flow from microscopic orifices and the associated enhancement of heat transfer. Adapted a conventional LDA system for use with fiber optics.

6/87 - 6/92      APPLICATIONS ENGINEER, TSI Inc., Fluid Mechanics Group

Provided applications support for customers in fluid mechanics research. Specialized in fluid velocity measurement techniques and instrumentation: laser Doppler velocimetry (LDV), hot wire anemometry (HWA), and particle image velocimetry (PIV). Gained hands-on experience with complex optical systems containing lasers and optical fibers. Worked with auto-correlation based signal and image processing techniques. Participated in design of custom built LDV optics for users with special requirements. Used optical design software (KIDGER) to predict performance of LDV systems. Conducted in-house fluid velocity experiments on models from customers. Pursued government research grants; wrote proposals and developed associated products. Presented measurement-technology developments at engineering conferences. Traveled to universities and customers' facilities in North America and Europe to give educational seminars, sales presentations, instrumentation demonstrations, training, system installations, and trouble-shooting. Developed marketing tools including product literature, manuals, catalogs, and video tapes.

8/86 - 6/87      RESEARCH ASSISTANT, University of Minnesota, Minneapolis

Received scholarship and research assistant position with plasma physics group in Mechanical Engineering. Additional training in thermofluids and optics led to position at TSI Inc.

2/85 - 8/86      SENIOR DEVELOPMENT ENGINEER, Honeywell Inc., USD

Developed scientific analysis tools for studying sonar and vehicle dynamics. Member of project team assigned to design major data reduction software package for Navy. Responsible for determining user requirements, designing software and developing Fortran code under the DEC VAX VMS operating system. Produced military-standard design and development documentation. Made key design presentation at project review with the Navy. Developed user interface for adapting large menu driven analysis systems to batch operations.

5/81 - 2/85      ENGINEER, Owens/Corning Fiberglas, Energy Research Lab

Conducted applied heat and mass transfer research. Planned and executed controlled laboratory and remote field experiments. Developed automated measurement instrumentation and interfaced with data acquisition systems. Designed and wrote control and data collection software. Conducted regression and time-series analysis of data. Developed analytic models and computer simulations in FORTRAN. Ran

product testing project. Management activities included writing proposals, project planning, budgeting, writing technical reports and papers, and supervising technicians. Project topics: moisture transport in residential walls, tracer gas delivery system for studying air infiltration, moisture mass-balance studies to predict residential cooling-energy consumption, influence of air intrusion on attic insulation performance, wall detail study to minimize air infiltration.

9/78 - 5/81       TEACHING ASSISTANT, University of Michigan  
Recitation and laboratory instructor for General Physics and Mechanical Engineering Thermodynamics.

1/79 - 8/79       RESEARCH ASSISTANT, University of Michigan, High Energy Physics Lab  
Developed particle tracking algorithms and data acquisition software for particle drift chamber.

6/77 - 8/78       RESEARCH ASSISTANT, University of Minnesota, Low Temperature Physics Lab  
Applied photofabrication and electron-beam exposure techniques to produce microscopic orifices.

### **PUBLICATIONS**

"A Moisture Mass Balance Model for Predicting Residential Cooling Energy Consumption," ASHRAE Transactions, Vol. 90, pt. 2, 1984.

"How are signals from a X-probe thermal anemometry system interpreted to give the magnitude and direction of a fluid's motion ?" Flow Lines Magazine, p. 10, Spring 1989.

"What techniques are used to make near-wall LDV measurements ?" Flow Lines Magazine, Spring 1991.

"Field Comparison of Conventional HVAC Systems with a Residential Gas-Engine-Driven Heat Pump," Proceedings of the ACEEE 1994 Summer Study on Energy Efficiency in Buildings.

"Impact of Residential Duct Insulation on HVAC Energy Use and Life-Cycle Costs to Consumers," ASHRAE Transactions, Vol. 102, pt. 1, 1996.

"Field Monitoring and Evaluation of a Residential Gas-Engine-Driven Heat Pump," Proceedings of the 1996 World Energy Engineering Conference (WEEC).

### **CONFERENCE PRESENTATIONS**

"Multi-cell Constant Concentration Tracer Gas System for Measuring Air Infiltration," (Research presentation: June 1984 ASHRAE meeting).

"A New Thermal Anemometer-based 3-D Flow Measurement System for Measurements in Turbulent Flows," (Research presentation: October 1988 at University of Missouri-Rolla, Eleventh Symposium on Turbulence).

"A New Approach to Non-Invasive Flow Measurements in Complex Flows," (Research presentation: September 1990 at University of Missouri-Rolla, Twelfth Symposium on Turbulence).

### **PROFESSIONAL AFFILIATIONS**

- AAPT
- ASME
- ASHRAE