

# RICHARD W. WIES

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## EDUCATION

- 1999      **Ph.D. in Electrical Engineering**  
*University of Wyoming*, Laramie, WY
- 1995      **Master of Science in Electrical Engineering**  
*University of Wyoming*, Laramie, WY
- 1992      **Bachelor of Science in Electrical Engineering**  
*University of Wyoming*, Laramie, WY
- 1990      **Associate of Science in Engineering**  
*Casper College*, Casper, WY

## TEACHING/INSTRUCTION

- Aug 1999-  
Present      **Assistant Professor**, *University of Alaska-Fairbanks, Electrical and Computer Engineering Power and Controls Option*  
Advising and instruction at the undergraduate and graduate level in Power and Controls. Courses include: Electric Machinery (EE 303), Power Systems (EE 404 and EE 406), Power Electronics (EE 408 and 608), Digital Control Systems (EE 671), and special topic courses in Adaptive Filtering and Nonlinear Systems (EE 693).
- Summer 2002,  
2003, 2004, &  
2005      **Alaska Summer Research Academy**, *University of Alaska-Fairbanks*  
Lead instructor for junior high and high school students for Electrical Engineering unit dealing with power and energy.
- Spring 1999      **Assistant Lecturer**, *University of Wyoming, Electrical Engineering*  
Instructor for senior Electrical Engineering course in Power Systems.
- Summer 1993,  
Summer 1995      **Engineering Summer Program**, *University of Wyoming, Electrical Engineering*  
Assistant instructor for program to expose high school juniors to the various engineering disciplines.
- Spring 1993-  
Fall 1998      **Teaching Assistant**, *University of Wyoming, Electrical Engineering*  
Instructor for laboratories in lower and upper level engineering courses including: Introduction to Engineering Problem Solving, Circuits, Electromechanics, and Automatic Control Systems.

## RESEARCH EXPERIENCE

- Jun 1999-  
Present      **Principal Investigator**, *University of Alaska-Fairbanks, Institute of Northern Engineering*
- 1) US DOE EPSCoR (Jun 2003-present)  
*Advanced Techniques for Power System Identification from Measured Data*  
-Continuation of Ph.D. research with DOE EPSCoR funding under a subcontract with the University of Wyoming.
  - 2) NSF CCLI (Jun 2003-Jun 2005)  
*A Novel Approach in Improving Power Electronics and Electric Drives Courses, Curriculum, and Laboratories: Multi-University Adaptation and Implementation*

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-Development and implementation of a novel Power Electronics and Electric Drives classroom and laboratory curriculum at UAF in collaboration with four other universities.

### 3) Alaska EPSCoR Seed Grant (Jun 2001-Jun 2002)

*Development and Implementation of Self-Sustainable Hybrid Power System Technologies in Cold Regions*

-Development of a research base leading to the submission of a full proposal to the US DOE National Energy Technology Lab for external funding.

### 4) US DOE Arctic Energy Technology and Development Laboratory AETDL (Jun 2002-present)

*Polar Regions Hybrid Remote Power Stations*

-Development of hybrid power systems for remote power applications in polar regions.

*Effects of Village Power Quality on Fuel Consumption and Operating Expenses*

-Development of an electric power quality monitoring and evaluation system for villages in remote rural Alaska in conjunction with Alaska Energy Authority and rural utilities.

Aug 1999-  
Present

**Co-Principal Investigator**, *University of Alaska-Fairbanks, Institute of Northern Engineering*

### 1) US DOE AETDL (Jun 2002-Dec 2004)

*Galena Electric Power - A Situational Analysis* (Jan-Dec 2004)

-Development of a system model for a situational analysis to determine the economics of operating the Galena power system from a nuclear power plant.

*Village Power Performance Monitoring* (June 2002-Nov 2004)

-Development of standardized monitoring and control systems for villages in conjunction with Alaska rural utilities.

### 2) NSF CISE (Oct 2004-present)

*Hardware-in-the-Loop Simulator*

-Development of hardware-in-the-loop simulators (HILS) systems to allow for remote computer control and simulation of systems with the actual full-scale hardware in place.

### 5) US Army Tank Command (Aug 1999-Aug 2000)

*Lightweight Robotic and Semiautonomous Ground Vehicle Mobility and Survivability Enhancements Program*

-Design and testing of a prototype electric drive for use in unmanned ground vehicles.

Jun 2004-  
Present

**Research Participant**, *University of Alaska-Fairbanks, Institute of Northern Engineering*

### 1) US DoD (Jun 2005-present)

*RAMGEN/Fuel Cell*

-Development a dynamic model and the design of the power electronics and electric drive interface between a high speed turbine (high frequency ac), a solid-oxide fuel cell (dc), and the power grid (60 cycle ac).

### 2) US DOE (Jun 2004-present)

*Amchitka Independent Assessment: Diffusion Measurements*

-Development and implementation of an electrical test bed to measure the resistivity of bedrock core samples taken from the island before nuclear testing in the 1960s and 1970s.

Summer 1995-  
May 99

**Ph.D. Dissertation**, *University of Wyoming, Electrical Engineering*

*“Use of Ambient Data for Estimating Low-Frequency Electromechanical Modes in Power Systems.”*

## RICHARD W. WIES

- DOE EPSCOR Research Fellow in conjunction with Battelle PNNL and Bonneville Power Administration (1995-1996).
- AWU Graduate Fellow at Battelle PNNL in Summer 96.

Spring 1995     **Masters Thesis**, *University of Wyoming, Electrical Engineering*  
“*The Effects of Transient Switching Harmonics from Adjustable-Speed Drives on the Communication Frequency Spectrum with Filtering Solutions as Applied to Electric Vehicles.*”

Fall 1992-  
Spring 1995     **Laboratory Research**, *University of Wyoming, Electrical Engineering*  
Worked as DOE/AWU Graduate Fellow in the University of Wyoming Motor Testing and Training Center.

- Aided in the design and construction of a 300HP dynamometer.
- Performed extensive testing of motors with IEEE and NEMA standards.
- Designed and constructed a 500W mobile solar energy demonstration.
- Analyzed RFI and EMI harmonics generated by power switching circuits.

Summer 1992    **Research Assistant**, *University of Wyoming, Electrical Engineering*  
Worked in conjunction with DOE Electric Motor Testing project

- Tested induction motors in the petroleum and mining industry.
- Analyzed and reported findings on energy use, efficiency and over-sizing of motors.

### PUBLICATIONS (Aug 1999-Present)

#### **BOOK CHAPTERS**

- 1) R. W. Wies, *The Power Electronics Handbook: DC-DC Converters*, CRC Press, Boca Raton, FL, Chap. 2: Sections 1, 3-5, Nov 2001.
- 2) D. L. Barnes, T. Wilson, and R. W. Wies, *Environment, People, and Resources in the North, Contaminants in Cold Regions: Remediation and Restoration*, K. Erickson and L. Duffy (Eds.), University of Alaska Press, in review.

#### **JOURNAL PUBLICATIONS**

- 1) R. W. Wies, R. A. Johnson, and A. N. Agrawal, “Life Cycle Cost Analysis and Environmental Impacts of Integrating Wind-Turbine Generators (WTGs) into Standalone Hybrid Power Systems,” *WSEAS Transactions on Systems*, iss. 9, vol. 4, pp. 1383-1393, 2005.
- 2) R. W. Wies, A. N. Agrawal, and T. J. Chubb, “Optimization of a PV with Diesel-Battery System for Remote Villages,” *International Energy Journal*, vol. 6, no.1, part 3, pp. 107-118, 2005.
- 3) M. G. Anderson, N. Zhou, J. W. Pierre, and R. W. Wies, “Bootstrap-based Confidence Interval Estimates for Electromechanical Modes from Multiple Output Analysis of Measured Ambient Data,” *IEEE Transactions on Power Systems*, vol. 20, no. 2, pp. 943-950, 2005.
- 4) R. W. Wies, R. A. Johnson, A. N. Agrawal, and T. J. Chubb, “Simulink Model for Economic Analysis and Environmental Impacts of a PV with Diesel-Battery System for Remote Villages,” *IEEE Transactions on Power Systems*, vol. 20, no. 2, pp. 692-700, 2005.
- 5) R. W. Wies, J. W. Pierre, and D. J. Trudnowski, “Use of ARMA Block Processing for Estimating Stationary Low-Frequency Electromechanical Modes of Power Systems,” *IEEE Transactions on Power Systems*, vol. 18, no. 1, pp. 167-173, 2003.

#### **CONFERENCE PROCEEDINGS**

- 1) R. W. Wies, A. N. Agrawal, R. A. Johnson, and T. J. Chubb, “Implementation of a Remote Terminal Unit on a Diesel Electric Generator for Performance Analysis of Remote Power Systems in Rural Alaska,” *2005 Alaska Rural Energy Conference*, Valdez (AK), 2005.

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- 2) R. W. Wies, R. A. Johnson, and A. N. Agrawal, "Integration of Wind-Turbine Generators (WTGs) into Hybrid Distributed Generation Systems in Extreme Northern Climates," *2005 Alaska Rural Energy Conference*, Valdez (AK), 2005.
- 3) J. L. Benning, D. L. Barnes, R. W. Wies, and M. Razavi, "Spatial and Scalar Effects on Diffusion of Radionuclides for Amchitka Island," *Environmental and Subsurface Science Symposium*, Big Sky (MT), 2005.
- 4) R. W. Wies, R. A. Johnson, and A. N. Agrawal, "Integration of Wind-Turbine Generators (WTGs) into Standalone Hybrid Power Systems in Extreme Northern Climates," 5th WSEAS International Conference on Power Systems and Electromagnetic Compatibility, Corfu Island, Greece, 2005.
- 5) R. W. Wies, R. A. Johnson, A. N. Agrawal and T. J. Chubb, "Using HOMER and Simulink for Long-Term Performance Analysis of a Hybrid Electric Power System in a Remote Alaskan Village," *NREL World Renewable Energy Congress VIII*, Denver, CO, 2004.
- 6) R. W. Wies, J. W. Pierre, and D. J. Trudnowski, "Use of Least-Mean Squares (LMS) Adaptive Filtering Technique for Estimating Low-Frequency Electromechanical Modes in Power Systems," *Proceedings of the 2004 IEEE Power Engineering Society General Meeting*, Denver, CO, 2004.
- 7) R. W. Wies, R. A. Johnson, A. N. Agrawal, and T. J. Chubb, "Economic Analysis and Environmental Impacts of a PV with Diesel-Battery System for Remote Villages," *Proceedings of the 2004 IEEE Power Engineering Society General Meeting*, Denver, CO, 2004.
- 8) R. W. Wies, A. N. Agrawal, T. J. Chubb and R. A. Johnson, "Simulink Model for Economic Analysis & Environmental Impacts of a Photovoltaic with Diesel-Battery System for Remote Villages," *2004 Alaska Rural Energy Conference*, Talkeetna (AK), 2004.
- 9) R. W. Wies, A. N. Agrawal, and T. J. Chubb, "Electric Power Quality of Distributed Generation Systems in Rural Alaskan Villages," *2004 Alaska Rural Energy Conference*, Talkeetna (AK), 2004.
- 10) R. W. Wies, A. N. Agrawal, and T. J. Chubb, "Optimization of a PV with Diesel-Battery System for Remote Villages," *International Conference on Electric Supply Industry in Transition*, Asian Institute of Technology, Bangkok, Thailand, 2004.
- 11) N. Zhou, J. W. Pierre, and R. W. Wies, "Estimation of Low-Frequency Electromechanical Modes of Power Systems from Ambient Measurements Using a Subspace Method," *Proceedings of the 2003 North American Power Symposium (NAPS)*, 2003.
- 12) R. W. Wies, J. W. Pierre, and D. J. Trudnowski, "Use of ARMA Block Processing for Estimating Stationary Low-Frequency Electromechanical Modes of Power Systems," *IEEE Transactions on Power Systems*, vol. 18, no. 1, pp. 167-173, 2003. *Invited paper at the 2003 IEEE Power Engineering Society General Meeting*, 2003.
- 13) R. W. Wies and A. N. Agrawal, "Integration of Wind-Turbine Generators (WTGs) into Hybrid Distributed Generation Systems in Extreme Northern Climates," *Proceedings of the 2003 International Yukon Wind Energy Conference: Cold Climate Opportunities*, 2003.
- 14) R. W. Wies and A. N. Agrawal, "Modeling and Optimization of Hybrid Electric Power Systems for Remote Locations in Extreme Climates," *Proceedings of the 2003 IASTED International Conference on Power and Energy Systems*, paper 379-190, pp. 241-246, 2003.
- 15) M. G. Anderson, J. W. Pierre, and R. W. Wies, "Confidence Interval Estimates for the Frequency and Damping Ratio of Electromechanical Modes using Ambient Data," *Proceedings of 2002 North American Power Symposium (NAPS)*, Tempe, Arizona, 2002.
- 16) R. W. Wies and J. D. Aspnes, "Design of an Energy-Efficient Hybrid Power Source for Remote Locations as a Student Project," *Proceedings of the 2002 ASEE Annual Conference Proceedings*, Session 2133, paper 2002-1289, 2002.
- 17) R. W. Wies and J. W. Pierre, "Use of Least-Mean Squares (LMS) Adaptive Filtering Technique for Estimating Low-Frequency Electromechanical Modes in Power Systems," in *Electric Power Systems*,

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Asok Ray and Joe H. Chow, Chairs, *Proceedings of the 2002 American Controls Conference*, paper ACC02-IEEE1025, 2002. (Awarded best paper in *Electric Power Systems* session.)

- 18) R. W. Wies, J. Mitchell, S. Daniels, J. G. Hawkins, "Analysis of Electric Machines and Drive Systems for Unmanned Ground Vehicle Applications," in *Unmanned Ground Vehicle Technology II*, Grant R. Gerhart, Robert W. Gunderson, Chuck M. Shoemaker, Editors, Proceedings of SPIE Vol. 4024, pp. 263-272 (2000).

### **SCIENTIFIC AND PROFESSIONAL SOCIETY MEMBERSHIPS**

- IEEE (1992-present), IEEE Power Engineering Society (1995-present), IEEE Power System Dynamic Stability Committee (2003-present)
- Tau Beta Pi (1991-present)

### **HONORS AND AWARDS**

- Invited Conference and Journal Paper: 2005 WSEAS International Conference on Power Systems and Electromagnetic Compatibility (see Journal 1 and Conference 4)
- Invited Paper: 2003 IEEE Power Engineering Society Conference (see Journal 5 and Conference 12)
- Best Paper in Electric Power Systems Session: 2002 American Controls Conference (see Conference 17)

### **INSTITUTIONAL AND PROFESSIONAL SERVICE**

- Member: UAF Faculty Senate/Graduate Academic and Advisory Committee (2004-present)
- Member (Chair): UAF CSEM and CEM Scholarship Committee (2000-present)
- Member: UAF Electrical and Computer Engineering Faculty Search Committee (2002-2003)
- Member: UAF Electrical and Computer Engineering Laboratory Report Subcommittee (2004-present)
- Journal Manuscript Reviewer: IEEE Transactions on Power Systems (1997-present), IEEE Transactions on Education (2000-present), International Journal of Adaptive Control and Signal Processing (2005), IEE Transactions on Generation, Transmission, and Distribution (2005).
- Proposal Reviewer: US Department of State Civilian Research & Development Foundation for Independent States of Former Soviet Union through International Science and Technology Center ISTC and Science and Technology Center in the Ukraine STCU (2004)
- Lead Instructor (EE Unit): Alaska Summer Research Academy (2002-2005)

### **PROFESSIONAL DEVELOPMENT ACTIVITIES**

- Attended 11 conferences and presented 13 papers (1999-present)
- Teaching Workshops (attended): *Teaching Power Electronics and Drives* (Jan. 2002 and Feb. 2004)
- Attended 11 cold regions and renewable energy related workshops

### **RESEARCH ACTIVITIES**

My main areas of interest include:

- electric power and control systems
- renewable and alternative energy systems
- power electronics and electric drives

My current research involves the:

- modeling and performance analysis of hybrid electric power systems for remote locations
- application of signal processing techniques for analyzing power system stability

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- development of classroom and laboratory curriculum for power electronics and electric drives courses.