
W. GEOFFREY COBOURN

Professor
Department of Mechanical Engineering
J. B. Speed School of Engineering
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Louisville, KY 40292



EDUCATION

D.Sc.	Mechanical Engineering	Washington University	1979
M.S.	Mechanical Engineering	Washington University	1977
B.S.	Mechanical Engineering	University of Missouri	1972

ACADEMIC EMPLOYMENT EXPERIENCE

- 1996 - Present University of Louisville, Louisville, Kentucky. Professor, Mechanical Engineering Department. *Teaching and research in mechanical engineering and air pollution science.*
- 1982 - 1996 University of Louisville, Louisville, Kentucky. Assistant Professor, Associate Professor, Mechanical Engineering Department.
- 1980 - 1981 Washington University, St. Louis, Missouri. Research Scientist, Mechanical Engineering Department. *Research in air pollution measurement and environmental effects of air pollution.*
- Spring 1980 University of Stockholm, Stockholm, Sweden. Visiting Scientist, Department of Meteorology. *Air pollution measurement and data analysis.*
- 1976 - 1979 Washington University, St. Louis, Missouri. Research Assistant, Mechanical Engineering Department. *Research in air pollution instrumentation.*

NON-ACADEMIC EMPLOYMENT EXPERIENCE

- 1973 - 1975 Westinghouse Electric Corporation, Philadelphia, Pennsylvania. Mechanical Engineer, Steam Turbine Division. *Applied research in aerodynamics and thermodynamics of turbomachinery; thermal design of axial-flow stream turbines.*

CONSULTING (PARTIAL LIST)

- 2000 - 2007 Kentucky Living, Business Edition. Columnist. "Saving Energy" a monthly column on energy conservation for Kentucky businesses.
- 1994 - 1995 LG&E Energy Corporation, Louisville, Kentucky. Consultant. *Air quality data analysis.*
- Fall 1995 Cummins Engine Company, Inc., Columbus, Indiana. Consultant. *Fuel pump performance analysis.*
- Summer 1985 Battelle Pacific Northwest Laboratories, Richland, Virginia. Consultant (UL contract). *Airborne air pollution instrumentation.*
- May 1984 Jefferson County Pollution Control Board, Louisville, Kentucky. Consultant. *Vehicle Emissions Testing Program (VET): quality assurance.*
- Summer 1983 Argonne National Laboratory, Argonne, Illinois. Visiting Faculty Research Scientist. *Air pollution measurement and data analysis.*
- May 1982 Canadian Environment Service, Ontario, Canada. Consultant. *Airborne air pollution instrumentation.*

SCIENTIFIC AND HONOR SOCIETIES

- Air and Waste Management Association

AWARDS AND RECOGNITION

Tom C. Evans Instructional Paper Competition, Award for the Best Engineering Instructional Paper published in 1994, awarded at the 1995 ASEE Southeastern Section Meeting.

TEACHING

COURSES TAUGHT

ME 580 Air Pollution Control	ME 570 Sustainable Energy Systems
ME 630 Turbomachinery	ME 616 Gas Dynamics
ME 610 Propulsion Systems	ME 510 Internal Combustion Engines
ME 401 Fluid Mechanics II	ME 311 Fluid Mechanics I
ME 310 Thermodynamics II	ME 251 Thermodynamics I

NEW COURSES DEVELOPED

- ME630 Tubomachinery ME 570 Sustainable Energy Systems
- ME 580 Air Pollution Control

ONLINE COURSE MATERIALS

Developed online course materials for the following courses: ME 401 Fluid Mechanics II, ME 570 Sustainable Energy Systems, ME580 Air Pollution Control, and ME 630 Turbomachinery . The course materials include copies of in-class lectures (delivered via tablet PC), copies of materials handed out in class, links to course-related web sites, software for homework and design exercises, and study guides for exams.

DISSERTATIONS AND THESIS DIRECTED

Dissertations Completed

Development of fuzzy system and nonlinear regression models for ozone and PM_{2.5} air quality forecasts, Lin, Yiqiu, Doctor of Philosophy, May, 2007.

Theses Completed (partial list)

Lin, Yiqiu. 2004. Development of ozone forecast models for selected Kentucky metropolitan areas. Thesis (M.S.)--University of Louisville, May, 2004.

A Regression Model to Forecast the Daily Peak 8-h Ozone Concentration for the Louisville Metropolitan Statistical Area, Charles G. Greenwell, Master of Engineering, December 2001.

The Evaluation and Comparison of Ozone Forecasting Models in Louisville, Kentucky, Chutikoon Gajaseni, Master of Science, December 1999.

Development of a Regression Model to Forecast Ground level Ozone Concentration in Jefferson County, Kentucky, Milton C. Hubbard, Master of Science, April 1997.

Analysis of Pulverized Coal Combustion, Zhenyu Zhu, Master of Science, December, 1995.

A Study of Louisville and Jefferson County Tropospheric Ozone from 1987 to 1990, Beverly Ann Byrum, Master of Engineering, May 1993.

Computer-Aided Design Study of Cylindrical-Type Electrostatic Recipitators, Karen Marie Vormbrock, Master of Engineering, December 1992.

Experimental Study of the Performance and Emissions of a Multi-Cylinder Engine Utilizing Ethanol and Methanol Blended Fuels, Richard Stanley Wagner, Master of Engineering, December 1992.

The Effect of the Vehicle Emission Inspection Program on Air Quality in Jefferson County, Kentucky, Kevin Matthew White, Master of Engineering, March 1991.

A Comparison of Various Fuels for NO_x Formation in the Internal Combustion Engine, James Leo Ray, Jr., Master of Engineering, August 1990.

RESEARCH

PUBLICATIONS

Refereed Journals

Lv, Baolei, Cobourn, W. Geoffrey, Bai, Yuqi, Development of nonlinear empirical models to forecast daily PM_{2.5} and ozone levels in three large Chinese cities, Atmospheric Environment, 147(12), 209-223, 2016.

Cobourn, W.G., An Enhanced PM_{2.5} Air Quality Forecast Model Based on Nonlinear Regression and Back-trajectory Concentrations, Atmospheric Environment, 44(25), 3015-3023, 2010.

Cobourn, W.G., Accuracy and Reliability of an Automated Air Quality Forecast System for Ozone in Seven Kentucky Metropolitan Areas, Atmospheric Environment, 41(28), 5863-5875, 2007.

Lin, Y. and Cobourn, W.G., Fuzzy System Models Combined with Nonlinear Regression for Daily Ground-Level Ozone Predictions, Atmospheric Environment, 41(16), 3502-3513, 2007.

Cobourn, W.G. and Lin, Y., Trends in Meteorologically Adjusted Ozone Concentrations in Six Kentucky Metro Areas, 1998-2002, Journal of the Air and Waste Management Association, 54, 1383-1393, 2004.

Cobourn, W. G., French, M. and Dolcine, L. J., A Comparison of Nonlinear Regression and Neural Network Models for Ground-Level Ozone Forecasting, The Journal of Air and Waste Management, 50, 2000.

Cobourn, W. G. and Hubbard, M. C., (1999), An Enhanced Ozone Forecasting Model using Air Mass Trajectory Analysis, Atmospheric Environment, 33, 4663-4676.

Hubbard, M. C. and Cobourn, W. G., (1998), Development of a Regression Model to Forecast Ground Level Ozone in Louisville, Kentucky, Atmospheric Environment, 32, 2637-2647.

Cobourn, W. G. and Lindauer, G. C. (1994), A Flexible Multimedia Instructional Module For Introductory Thermodynamics, Journal of Engineering Education, 83, 271-277.

Cobourn, W. G., Gauri, K. L., Li, S., Saltik, E., and Tambe, S. (1993), Laboratory Measurements Of SO₂ Deposition Velocity Over Marble And Dolomite Stone Surfaces, Atmospheric Environment, (Part B: Urban Atmosphere), 27B, 193-201.

Tambe, S., Cobourn, W. G., Gauri, K. L., and Li, S. (1991), Kinetic Study Of SO₂ Reaction With Dolomite, Environmental Science and Technology, 25, 2071-2075.

Cobourn, W. G. and Mulrooney, R. E. (1988), Response Of A Doped FDP Analyzer With Logarithmic Amplifier To Low Level Sulfur Concentrations, Atmospheric Environment, 22, 1941-1947.

Morandi, M. T., Kneip, T. J., Cobourn, W. G., Husar, R. B., and Lio, P. J. (1983), The Measurement Of H₂SO₄ And Other Sulfate Species At Tuxedo, New York With A Thermal Analysis Flame Photometric Detector And Simultaneously Collected Quartz Filter Samples, Atmospheric Environment, 17, 843-848.

Cobourn, W. G. and Husar, R. B. (1982), Study Of Particulate Sulfur-Light Scattering Relationship Using In-Situ Aerosol Thermal Analysis, Journal of Geophysical Research, 87, 11223-11228.

Cobourn, W. G. and Husar, R. B. (1982), Diurnal And Seasonal Patterns Of Particulate Sulfur And Sulfuric Acid In St. Louis, July 1977 - June 1978, Atmospheric Environment, 16, 1441-1450.

Camp, C. C., Stevens, R. K., Cobourn, W. G., and Husar, R. B. (1982), Intercomparison Of Concentration Results From Fine Particle Sulfur Monitors, Atmospheric Environment, 16, 911-916.

Cobourn, W. G., Djukic-Husar, J., Husar, R. B., and Kohli, S. (1981), Airborne In-Situ Measurement Of Particulate Sulfuric Acid With Flame Photometry And Thermal Analysis, Atmospheric Environment, 15, 2565-2571.

Cobourn, W. G., Djukic-Husar, J. and Husar, R. B. (1980), Monitoring Of Sulfuric Acid Episodes In St. Louis, Missouri, Journal of Geophysical Research, 85, 4487-4494.

Delumyea, R., Macias, E. S., and Cobourn, W. G. (1979), Detection Of The Presence Of Ambient Acid Sulfate Aerosols From The Sulfur/Nitrogen Ratio, Atmospheric Environment, 13, 1337-1338.

Cobourn, W. G., Husar, R. B., and Husar, J. D. (1978), Continuous In-Situ Monitoring Of Ambient Particulate Sulfur Using Flame Photometry And Thermal Analysis, *Atmospheric Environment*, 12, 89-98.

Proceedings Papers (partial list)

Cobourn, W.G., “Updated Trends in Meteorologically Adjusted Ozone Concentrations in Seven Kentucky Metro Areas,” *2000-2004 AWMA Conference on Environmental Data Analysis*, Oak Brook, IL, October 4-5, 2005.

Alexander, S.M., Lee, W., Cobourn, W.G., And Hubbard, M.C., 2000. A Fuzzy Logic Model For Ground-Level Ozone Forecasting. *Proceedings Of The Industrial Engineering Research 2000 Conference*, June 2000.

Papers Presented at Meetings (partial list)

Lin, Y. and Cobourn, W.G., “Fuzzy system Models combined with Nonlinear Regression for Daily ground-level Ozone Predictions,” *2000-2004 AWMA Conference on Environmental Data Analysis*, Oak Brook, IL, October 4-5, 2005.

Flieschman, M., Watters, J. C., and Cobourn, W. G. Examples from P2 and Energy Assessments at Small- to Medium-Sized Manufacturers, Cairo International Conference on Energy and Environment, Cairo, Egypt, June 3-6, 1996.

Technical Reports (partial list)

Research Report 2001: Ozone Forecast Model Development for the Louisville and Lexington Metropolitan Areas, report to the Kentucky Transportation Cabinet, December 2001.

Research Report 2000: Ozone Forecast Model Development for the Louisville MSA, report to the Jefferson County Air Pollution Control District, December 2000.

Injection Molding System Flow Analysis, Report to Gates Rubber Company, October, 2000.

Energy and Waste Assessment of a Corrugated Packaging Manufacturing Plant, (co-author), Report No. 215 to Rutgers University (agent for US DOE), June 1999.

Energy and Waste Assessment of a Corrugated Packaging Manufacturing Plant, (co-author), Report No. 217 to Rutgers University (agent for US DOE), May, 1999.

Energy and Waste Assessment of a Custom Hardwood Furniture Manufacturing Plant, (co-author), Report No. 225 to Rutgers University (agent for US DOE), September, 1999.

Energy and Waste Assessment of a Trailer Coupler, Jacks and Winches Manufacturing Plant, (co-author), Report No. 234 to Rutgers University (agent for US DOE), December 1999.

GRANTS AND CONTRACTS

Proposals Funded by External Sources

Kentucky Automated Air Quality Forecast System (PI: W. G. Cobourn), Kentucky Transportation Cabinet (USDOT flowthrough), August 23, 2007 - August 23, 2010, \$262,407.

Statewide Ozone Forecast Model Development: 2004-2005 (PI: W. G. Cobourn), KYTC (USDOT flowthrough), Jan 1, 2005 - December 31, 2005, \$189,469.

Ozone Forecast Model Development: Lexington, 2001-2002 (PI: W. G. Cobourn), KYTC/USDOT , Jan 1, 2003 - December 31, 2003, \$30,000.

Ozone Forecast Model Development: Louisville, 2003 (PI: W. G. Cobourn), KYTC/USDOT, Jan 1, 2003 - December 31, 2003, \$30,000.

Ozone Forecast Model Development: Lexington, 2001-2002 (PI: W. G. Cobourn), KYTC/USDOT, October 2000 - June 2002, \$70,630.

Ozone Forecast Model Development: Louisville, 2001-2002 (PI: W. G. Cobourn), KYTC/USDOT, October 2000 - June 2002, \$66,952.

Ozone Air Quality Forecasting and Display (PI: W. G. Cobourn), Jefferson County Air Pollution Control District , November 1997 - December 2000, \$76,400.

Ozone Air Quality Forecasting and Display (PI: W. G. Cobourn), LGE Energy Corporation, November 1997-December 1998, \$5,000.

Industrial Assessment Center (PI: W. G. Cobourn (34% participation), Co-PI's: J. Watters, G. Depuy), Rutgers University (agent for US DOE), October 1997 - May 2001, \$465,000.

Industrial Assessment Center, (PI: J. Watters, Co-Pi's: W. G. Cobourn (33% participation), M. Fleischman), Rutgers University (agent for US DOE), October 1996 - September 1997, \$91,250.

Industrial Assessment Center, (PI: J. Watters, Co-Pi's: W. G. Cobourn (25% participation), M. Fleischman, D. J. Collins), Rutgers University (agent for US DOE), October 1995 - September 1996, \$161,810.

Industrial Assessment Center, (PI: J. Watters, Co-PI's: W. G. Cobourn (12.5% participation), R. E. Stewart, M. Fleischman), Rutgers University (agent for US DOE), October 1994 - September 1995, \$155,700.

Development of Multifaceted Module for Introductory Thermodynamics, (PI: G. C. Lindauer, Co-PI's: W. G. Cobourn (45% participation), R. L. Collins, T. E. Mullin, W. P. Hnat), National Science Foundation, June 1991 - December 1993, \$90,000.

Review, Evaluation and Error Analysis of Vogt Ice Machine Efficiency Intercomparison Testing Program, (PI: W. G. Cobourn), August 1985 - May 1986, \$5,000.

Continuous Particulate Sulfur Measurement for the "Ventex-85" Project, (PI: W. G. Cobourn), Battelle Pacific Northwest Laboratories, July 1985 - August 1985, \$1,500.

Kentucky Methane Transportation Fuels Demonstration and Testing Project, (Co-PI's: D. Akers, W. G. Cobourn (20% participation), R. L. Collins, J. B. Dressman, et al.), Kentucky Transportation Cabinet, August 1982 - December 1983, \$150,000.

SERVICE AND PROFESSIONAL DEVELOPMENT

Service Activities (current)

- General Education Curriculum Committee, Committee Member. (August 1, 2013 - Present).
- Speed School Faculty Council, Committee Member. (January 1, 2015 - Present).
- Speed School Faculty Activity Committee, Committee Member. (September 1, 2016 - Present).
- ME Department Faculty Activity Committee, Committee Member. (January 1, 2012 - Present).
- Reviewer, Atmospheric Environment, Journal of Air and Waste Management, and Science of the Total Environment, and Environmental Modeling and Software.

Professional Development Activities (Past Five Years)

- Green Threads: Sustainability Across the Curriculum, a series of workshops for faculty engaged in developing courses that focus on sustainability.

Other Professional and Service Activities (current)

- Ongoing development and maintenance of UofL Automated Forecast System (AFS), an online system (<http://aircastul.cecsresearch.org>) for forecasting next-day ground-level ozone and PM2.5 for several metropolitan areas in Kentucky, including Louisville, Lexington, and the Cincinnati/Northern Kentucky CBSA. The AFS is used by air quality forecasters in these metro areas.