

Résumé  
**Dwane A. Paulsen**  
**Mechanical Engineer / Research Engineer / Technical Consultant**  
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**Skills**

- Aerosol Particle Generation / Characterization
- Automation / Controls
- Documentation / Reports
- Flow Sensor / Instrument Design
- Fluid Flow Analysis / CFD
- Heat Transfer Analysis / FEA
- Mechanical Engineering / CAE
- PIC / PID Controllers
- Process Control / Optimization
- Simulation / Modeling
- SOP for quality assurance
- Spectrometry – Light / Mass
- Systems Engineering

**Programming Languages**

- Fortran
- Labview
- Mathematica
- Matlab
- Visual Basic

**Selected Software**

- ALGOR (FEA)
- COMSOL Multiphysics
- Engineering Equation Solver (EES)
- FLUENT / GAMBIT (CFD)
- ANSYS CFD 12.1
- Wavemetrics Igor Pro
- Latex Typesetting
- Microsoft Access, Excel, PowerPoint, and Word
- Microsoft Visio
- Origin
- Solidworks

**Education:**

- **ETH, Zurich** **2001-2004**  
*Ph.D.*, Science, Department of Chemistry and Applied Biosciences
  
- **University of Minnesota** **1999-2001**  
*M.S.*, Mechanical Engineering  
*B.S.*, Civil Engineering with Distinction **1994-1999**

**Work Experience:**

**CH2M Hill, Portland, OR** **Jun 2009 to Jul 2010**  
*Mechanical Engineer / Technical Specialist*

- CFD analysis of power plant exhaust ducts for mercury sorbent injection optimization.
- Investigated mercury sorbent break-up issues and quickly developed solutions.
- External flow analysis for manufacturing facility exhaust transport and dispersion.
- Developed testing protocols for high-tech data centers.
- Responsible for bringing current simulation team up-to-date with the latest fluid flow simulation procedures and software.

**Portland Community College, Portland, OR** **Winter 2010**  
*Part-time Instructor – Manufacturing Processes*

- Responsible for course curriculum development and teaching of course material.
- Developed and graded tests and homeworks.
- Arranged five class tours of local manufacturing facilities.

**Physical Sciences Inc., Andover, MA** **Jan 2007 to Jul 2008**  
*Principal Engineer / Scientist*

- Engineered flow-control systems for gas sensors and bio-aerosol particle instrumentation.
- Developed a bio-aerosol trigger for the U.S. Department of Homeland Security (DHS) using spark-induced breakdown spectroscopy (SIBS).
- Designed aerosol generators and characterized aerosol particle concentrators and sampling inlets.
- Performed simulations using Computational Fluid Dynamics (CFD, FLUENT) for multiphase flow, gas sensors, supersonic nozzles, thrusters, and pharmaceutical applications.
- Designed instrumentation using heat transfer Finite Element Analysis (FEA) software (ALGOR).

**Harvard University, Cambridge, MA**

Jan 2005 to Jan 2007

*Postdoctoral Fellow, School of Engineering and Applied Sciences*

- Designed and built a new instrument to detect phase change irreversibility of nanometer-sized airborne particles using an on-line technique.
- Supervised the design and development of an environmental chamber for studies of aerosol particle chemistry and physics.
- Developed software for instrument automation and data analysis.

**Acillix Inc., Somerville, MA**

Sep 2005 to Sep 2006

*Principal Engineer (startup)*

- Designed and constructed a pilot-scale test facility for a new microbial-based technology.
- Conducted tests of an environment-friendly patent-pending method which uses microorganisms to demineralize water.

**Paul Scherrer Institute, Villigen-PSI, Switzerland**

2001-2004

*Ph.D. Student / Project Manager, General Energy Department*

- Developed and characterized an environmental chamber to simulate atmospheric smog chemistry.
- Designed and built an instrument to measure the volatility of polymerizing nanometer-sized aerosol particles.
- Promoted to project manager (2003) with subsequent findings published in *Science* (2004).
- Designed an automated instrument flow system which has been adopted by internationally recognized projects.
- Wrote software programs for human-machine interface, process control, data management and storage, and data analysis.
- Trained and advised undergraduate and graduate students.

**University of Minnesota, Minneapolis, MN**

1999-2001

*Graduate Research Assistant, Department of Mechanical Engineering, Power and Propulsion Division*

- Designed particulate sampling systems for diesel and spark ignition after-treatment device testing.
- Developed passive and active dilution systems for sensitive instrumentation.
- Conducted field studies of heavy-duty truck and passenger car emissions.
- Assisted in the design and construction of a mobile laboratory for on-road combustion aerosol particle sampling and diesel particulate filter testing.

*Undergraduate Research Assistant*

1996-1999

- Individually designed, built, and calibrated a nanoparticle-sizing spectrometer.
- Calibrated and maintained gas analyzers, particle instruments, and engine/dynamometer controls.
- Assisted in development, testing, and data analysis of engine exhaust dilution tunnels.
- Carried out engine breakdown and rebuild.

**Licensure:**

- 1998- Engineer in training (EIT), passed Fundamentals of Engineering Examination

**Professional Societies:**

- American Association for Aerosol Research
- Association of Energy Engineers (AEE)
- 2000- Society of Automotive Engineers (SAE)
- 1997- Member of Tau Beta Pi, The National Engineering Honor Society

**Honors:**

- 2000 Recipient, Murphy-Robertson Research Fellowship in Power and Propulsion
- 1998 Recipient, G. Borge Civil Engineering Scholarship

**Second Languages:**

- Conversational German
- Understanding of Swiss German

## **Volunteer Activities:**

- Association of Energy Engineers (AEE), Columbia River Chapter
- Spruce up Laurelhurst Park – Portland, Oregon
- The ReBuilding Center – Portland, Oregon
- Nursing Home Clean-up – Minneapolis, MN
- 1997 Twin Cities-Chicago AIDS Ride

## **Publications:**

Rosenoern, T., Paulsen, D., and Martin, S. T. (2009). The 1-by-3 tandem differential mobility analyzer for measurement of the irreversibility of the hygroscopic growth factor. *Aerosol Science & Technology*, 43, (7), 641-652.

Davis, S. J., Lee, S., Oakes, D. B., Haney, J., Magill, J. C., Paulsen, D. A., Cataldi, P., Galbally-Kinney, K. L., Vu, D., and Poley, J. (2008). EOIL power scaling in a 1-5 kW supersonic discharge-flow reactor. *Proceedings of SPIE*, 6874, 68740D.

Alfarra, M. R., Paulsen, D., Gysel, M., Garforth, A. A., Coe, H., Dommen, J., Prévôt, A. S. H., and Baltensperger, U. (2006). A mass spectrometric study of secondary organic aerosols formed from the photo-oxidation of anthropogenic and biogenic precursors in a reaction chamber. *Atmospheric Chemistry and Physics Discussions*, 6, 7747-7789.

Biskos, G., Paulsen, D., Russell, L. M., Buseck, P. R., and Martin, S. T. (2006). Prompt deliquescence and efflorescence of aerosol nanoparticles, *Atmospheric Chemistry and Physics*, 6, 4633–4642.

Paulsen, D., Weingartner, E., Rami Alfarra, M., and Baltensperger, U. (2006). Volatility measurements of photochemically and nebulizer-generated organic aerosol particles. *Journal of Aerosol Science*, 37, (9), 1025.

Baltensperger, U., Kalberer, M., Dommen, J., Paulsen, D., Alfarra, M. R., Coe, H., Fisseha, R., Gascho, A., Gysel, M., Nyeki, S., Sax, M., Steinbacher, M., Prévôt, A. S. H., Sjögren, S., Weingartner, E., and Zenobi, R. (2005). Secondary organic aerosols from anthropogenic and biogenic precursors. *Faraday Discussions*, 130, 265-278.

Paulsen, D., Dommen, J., Kalberer, M., Prévôt, A. S. H., Richter, R., Sax, M., Steinbacher, M., Weingartner, E., and Baltensperger, U. (2005). Secondary organic aerosol formation by irradiation of 1,3,5-trimethylbenzene-NO<sub>x</sub>-H<sub>2</sub>O in a new reaction chamber for atmospheric chemistry and physics. *Environmental Science & Technology*, 39, (8), 2668-2678.

Ramachandran, G., Paulsen, D., Watts, W., and Kittelson, D. (2005). Mass, surface area and number metrics in diesel occupational exposure assessment. *Journal of Environmental Monitoring*, 7, (7), 728-735.

Fisseha, R., Dommen, J., Sax, M., Paulsen, D., Kalberer, M., Maurer, R., Höfler, F., Weingartner, E., & Baltensperger, U. (2004). Identification of organic organic aerosol and the acids in secondary corresponding gas phase from chamber experiments. *Analytical Chemistry*, 76, (22), 6535-6540.

Gysel, M., Weingartner, E., Nyeki, S., Paulsen, D., Baltensperger, U., Galambos, I., and Kiss, G. (2004). Hygroscopic properties of water-soluble matter and humic-like organics in atmospheric fine aerosol. *Atmospheric Chemistry and Physics*, 4, 35-50.

Kalberer, M., Paulsen, D., Sax, M., Steinbacher, M., Dommen, J., Prévôt, A. S. H., Fisseha, R., Weingartner, E., Frankevich, V., Zenobi, R., and Baltensperger, U. (2004). Identification of polymers as major components of atmospheric organic aerosols. *Science*, 303, (5664), 1659-1662.

Contributing author, HEI, Research directions to improve estimates of human exposure and risk from diesel exhaust, Health Effects Institute (2002), Cambridge, MA.

Kittelson, D. B., Johnson, J., Watts, W., Wei, Q., Drayton, M., Paulsen, D., and Bukowiecki, N. (2000). Diesel aerosol sampling in the atmosphere. Society of Automotive Engineering, 2000-01-2212.