

Bernhard Andreas Heiden

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E-portfolio: <http://portfolio.uni-graz.at/ppb6afe53b50d6309b6aede3e759442839>

Education:

- Ph.D. Mechanical Engineering Technical University Graz (2006)
- M.S. Process Engineering Technical University Graz (2002)

Ph.D.Dissertation: "Development of a Coagulation Coefficient Measurement Device (CMD) for the Measurement of the Coagulation Coefficient of Nanoparticles in the Size Range from 10 to 1000 nm", advised by Peter J. Sturm at Graz University of Technology, Austria and Athanasios G. Konstandopoulos at CPERI, Greece:

A mobile coagulation measurement device (CMD) was developed, measuring the coagulation coefficient (K) of nanoparticles. A constant concentration aerosol reactor has been built, tested and automated with LABVIEW, allowing for variable volume and time dependent concentration aerosol measurements. The theoretic approach reduced the fundamental general dynamics equation (GDE) to a logistic type equation accounting essentially for coagulation, diffusion and a constant reactor surface. The measurement of the number concentration decay and their distribution allows, together with the developed theory, for the evaluation of K.

Honors and Awards

- Entrepreneur training with distinction Austrian Chamber for Economy, 2013
- Graduated with distinction Technical University Graz, 2006
- Foreign study stipendiate ETH Zurich, Summer 1999

Research Experience

Researcher, Research and Development, ELIN Motoren GmbH, Preding, Austria

- Fluid mechanics and heat transfer modeling of gaseous and liquid flows
- Design of numeric and analytic calculation methods based on heat balancing equations
- Extending to instationary solutions
- statistical, particle growth and package density modeling
- Familiarity and experience with parallel computing, upsetting of HPC workstation cluster, parallel programming with Excel HPC
- Familiarity and experience with data logging, heat flow, flow, pressure temperature measurements

Research Assistant, Thermodynamics and Combustion Engines Department, University of Technology Graz, Austria

- Aerosol and fluid measuring using: SMPS, ELPI, CPC, TEOM: PM_{10} , $PM_{2.5}$, CO_2 , NO_X
- Experimental setting up of aerosol measurements
- Development of a new coagulation measurement device with LABVIEW programming and constant surface coagulation chamber
- Understanding, interpretation and calculation of the Smoluchowski equation. Diffusion particle coagulation modeling
- Emission and immission research, particle dispersion calculating and modeling
- Inventing measurement devices: a coagulation measurement device and a nanoparticle mass measurement device (applied for patent 2012)
- Investigation of the dilution process of aerosols both theoretical and by measurement of total mass and number size distributions

Relevant Work Experience

Researcher	ELIN Motoren GmbH	02/2007-12/2012
Research Assistant	University of Technology Graz	09/2002-09/2006
Tutor	University of Technology Graz	Fall 2002-Summer 2006
Student intern	AVL-List GmbH Graz	07/1996-08/1996

Teaching Experience

Project Manager	Fluid Flow and Heat Transfer	ELIN Motoren GmbH	2007-2012
Visiting Professor	Atmospheric Aerosols and Air Pollution	Polytechnic University of Timișoara	Summer 2006
Teaching Assistant	Atmospheric Aerosols and Air Pollution	University of Technology Graz	2002-2006
Tutor	Fluid Mechanics & Heat Transfer	University of Technology Graz	2003-2006

Master Thesis Supervision

Bakk, E.S.	Testing Routines for a Correct Coagulation Measurement with the Coagulation Measurement Device (CMD) (in German)	2005
Brugger, B.H.	Fail-Safe Analysis of a Coagulation Measurement Device (CMD) (in German)	2006

Leadership Experience

Project Management	Industry Projects	ELIN Motoren GmbH	2007-2012
Project Management	Emission Inventory	University of Technology Graz	2002-2006

Publications**Journal Articles**

- Sturm, P.-J.; Baltensperger, U.; Bacher, M.; Lechner, B.; Hausberger, S.; Heiden, B.; Imhof, D.; Weingartner, E.; S.H. Prevot, A.; Kurtenbach, R.; Wiesen, P.: *Roadside Measurements of Particulate Matter (PM) Size Distribution* - in: Atmospheric Environment (2003), S. 5273-5281

Conference Papers

- Heiden B.: *Aspects of the CFX-Radial-Fan Simulation* in German, ELIN Motoren GmbH, in: Ansys Conference and & 7th CADFEM Austria Users' meeting (ACUM 2011), EURO PLAZA Conference Center, 7.4. 2011, Vienna, Austria
- Heiden, B.: *Towards a General Solution of the Pressure Drop Characteristic of Meandered Channel Flow*, ANSYS Conference & 26th CADFEM User's Meeting 2008, Oct. 22.-24. 2008, Darmstadt, Germany
- Heiden, B.: *About a New Coagulation Measurement Device (CMD)*, in International Aerosol Conference, 6.F.5 p. 679, Sept. 10.-15. 2006, St. Paul Minnesota, USA
- Heiden, B.; Morcos, M.; Sturm, P.J.: *Cigarette Smoke Coagulation Measurement and Emission Factor Determination*, in: Scientific Bulletin of the Polytechnic University of Timișoara, Romania, Tomul 51(65) p. 131-134, 2006, ISSN 1224-6077
- Heiden, B.: *About the Irregularities Measured with the SMPS without Reverse Scanning Mode* in: 10th ETH-Conference on Combustion Generated Nanoparticles, Aug. 21.- 23. 2006, Zurich, Switzerland
- Heiden, B.: *Introduction of a Simple Markov Chain Particle Growth Model* - in: European Aerosol Conference (2005), p. 331, Ghent, Belgium
- Heiden, B.: *Physical Causes of Fine Dust and its Effects on Human Lungs*, in: 9th ETH Conference on Combustion Generated Nanoparticles, Aug. 15.-17. 2005, Zurich, Switzerland
- Heiden, B.; Sturm, P.J.; Pretterhofer, G.; Le An Tuan; Ivanisin, M.: *Exhaust Gas Dispersion Effects under Controlled Environmental Conditions*: in 10th EAEC European Automotive Congress - Paper EAEC05YU-EM06, p. 1-12, 30th May - 1st June 2005, Beograd, Yugoslavia
- Heiden, B.; Sturm, P.-J.: *Development of a Coagulation Coefficient Measurement Device (CMD)* - in: Scientific Reunion of the Special Program of the Alexander von Humboldt Foundation concerning the Reconstruction of the South Eastern Europe - SUSTAINABILITY FOR HUMANITY & ENVIRONMENT IN THE EXTENDED CONNECTION FIELD SCIENCE - ECONOMY - POLICY (2005), p. 75 - 78, Timișoara, Romania
- Ivanisin, M.; Bischof, O.F.; Zerrath, A.; Krinke, T.; Heiden B.: *Exhaust Gas Particle Measurement Methods and Effects on the Exhaust Gas Treatment for the Particle Number Emissions* in German, CTI Fachkonferenz, Diesel-Partikel-Filter, Stuttgart, Germany
- Heiden B.: *NANOPARTICLES T15: Measurement of 'Fine Dust' Quantities, Especially Nanoparticle Number Size Distributions, PM10 Mass Monitoring and Nanoparticle Coagulation Behavior* in Cooperation Workshop: Medicine Meets Technology, 26. April 2005, Graz, Austria

- Heiden, B.; Ivanisin, M.; Sturm, P.-J.; Hausberger, S.: *Nanoparticle Formation as a Function of Different Concentrations* - in: European Aerosol Conference (2004), p. 927 - 928, Budapest, Hungary
- Heiden, B.; Ivanisin, M.; Sturm, P.-J.; Hausberger, S.: *Nanoparticle Formation as a Function of Different Concentrations* - in: Combustion Generated Nanoparticles (2004), 1-6, 8th ETH Conference, Zurich, Switzerland

Government Papers

- Heiden, B.; Zelle, K.; Schechtner, O.: *Emission Inventory Graz 2001, Partial Report Industry and Trade / Domestic Fuel, Revision 1* in German (2008) 129 p., FVT mbH & ADIP-Graz, Graz, for the Styrian Government, FA 17c, Graz, Austria
- Heiden, B.; Öttl, D.: *Road Charge Bypassing - Emission and Immission Calculation* in German (2004) 22 p., FVT mbH, Graz, for the Styrian Government FA 17c
- Heiden, B.; Hinterhofer, M.: *Emission Inventory Graz 2001, Partial Report Traffic - Reference Year 2003* in German (2004) 64 p., FVT mbH, Graz, for the Styrian Government, FA 17c, Graz, Austria
- Heiden, B.; Sturm, P.-J.: *Consequences of the Traffic Measures of the Measure Catalog According to IG-L (Immission Law - Air in Austria) for PM and Nitrogen Dioxide for the Metropolitan Area of Graz 2003* in German (2003), TU-Graz, Austria, for the Styrian Government
- Sturm, P.-J.; Heiden, B.: *Consequences of the Traffic Measures of the Measure Catalog According to IG-L (Immission Law - Air in Austria) for PM and Nitrogen Dioxide for Voitsberg & Koeftlach* in German (2003), TU-Graz, Austria, for the Styrian Government
- Heiden, B.: *Specifications for the Emission Inventory Graz 2002* in German (2003), TU-Graz, Austria, for the Styrian Government
- Sturm, P.J.; Heiden, B.: *PARTICULATES, Characterisation of Exhaust Particulate Emissions from Road Vehicles, Deliverable 7 - Roadside Measurements of PM Size Distribution - EUROPEAN COMMISSION*, - in the framework of: Fifth Framework Programme, p. 1-24, (2002)
- Heiden, B.; Sturm, P.J.: *Technical Possibilities for the Reduction of the Traffic Induced Particle Emissions* in German (2002) 35 p., TU-Graz, for the Styrian Government FA 17c, Graz, Austria

Teaching Publications

- Heiden, B.: *Skript for Material Exchange (Chemical Engineering) - Examination Examples - Part Solution* (279 p.) (2002), ÖH TU-Graz, Austria
- Heiden, B.: *Electronic Data Processing for Mathematics I on the HP48* in German (1992), ÖH TU-Graz, Austria

Patents (pending)

- Heiden, B.: *Cooling of a Wire Head Room* in German, European patent office application: EP13195074.3
- Heiden, B.: *Wire Head High Velocity Cooling* in German, cooling method for improvement of cooling of electric generators/engines in the same volume, Austrian patent application: A1263-2012
- Heiden, B.; Sturm P.J.: *In Situ Nanoparticle Mass Measurement Device* in German, measurement device of nanoparticles between 10 and 1000 nm, Austrian patent office application: A1252-2012
- Heiden, B.: *Construction and Method to Build a Generator with High Power-Density (Power/Volume)* in German, a motor or generator which is enhanced in power compared to conventional methods by means of a hybrid cooling method, Austrian patent office application: A1251-2012