

1. Full name

Surname, given names: Järvinen, Mika, Petteri
 Gender: male



2. Date and place of birth, nationality, current residence

Date and Place of Birth: 24th July 1972, Lahti, Finland
 Nationality: Finnish
 Current residences: Kastanjakuja 1 bA 17, 01710, Vantaa
 Himokorventie 80, 31380, Letku

3. Education and degrees awarded

D. Sc. (Tech.) 13.12.2002, former Helsinki University of Technology, Department of Energy technology, supervisors Esa Vakkilainen and Ron Zevenhoven, major Energy engineering and environmental protection, “Numerical Modeling of the Drying, Devolatilization and Char Conversion Processes of Black Liquor Droplets”, *Passed with Distinction*
 M. Sc. (Tech.) 15.6.1997, Lappeenranta University of Technology, Department of Energy Technology, Combustion Engineering, Master’s Thesis: “Modeling of black liquor combustion of recovery boiler furnaces”.

4. Linguistic skills

Mother tongue: Finnish
 Other languages: English (fluent)
 Swedish (good)

5. Current position

1.12.2013-31.11.2018 **Associate Professor** (fixed term), Aalto University, Department of Energy Technology, Energy engineering and environmental protection
 1.9.2012-30.8.2017 **Academy Research Fellow** with the topic “Environmental Protection by Crushing Numbers - Towards the Next Generation Process Simulators for Energy, Materials and Economy Efficient Processes”

6. Previous work experience

1.5.2012-31.12.2013 Professor (fixed term), Aalto University, Department of Energy Technology, Energy engineering and environmental protection
 2003-2012 Post-doctoral researcher, former Helsinki University of Technology
 1998-2003 Researcher, Post-graduate student, former Helsinki University of Technology
 1996-1997 Research Engineer, Ahlstrom Machinery Corporation, Helsinki/Varkaus Finland
 1996 (summer) Research Assistant, former Helsinki University of Technology
 1995 Assistant, Combustion Engineering, Lappeenranta University of Technology, Department of Energy Technology

7. Research funding as well as leadership and supervision

- **Academy Research Fellow** (2012-2017) with the topic “Environmental Protection by Crushing Numbers - Towards the Next Generation Process Simulators for Energy, Materials and Economy Efficient Processes”, 650 000 €
- BioSCWG - Biomass Supercritical Water Gasification Integration with CHP units - Definition of novel social and political constraints for enlarged multi-objective optimisation, Academy of Finland, AKA-CNPq, 2013-2015, 465 000 €
- Innovative Green Suspension Technology/Innovis, TEKES/Andritz/Metso, 2010-2012, 205 000 €
- Advanced Melt Metallurgy/AMMe, Fimecc-SHOK, TEKES, 2009-2014, 280 000 €
- Modelling interfacial partitioning in multi-phase systems/INTER, TEKES/Andritz/Metso, 2008-2009, 91 000 €
- Multiphase Chemistry in Process simulations/VISTA, TEKES, Andritz, Fortum Nuclear Services, Luvata, Outotec, Outokumpu Stainless, Ovako Bar, Rautaruukki, UPM, 2005-2007, 80 000 €
- Effective and cost-efficiency for production of ferritic stainless steels/FEMA, TEKES, Outokumpu Stainless Oyj, 2007-2009, 105 000 €
- Validation and Implementation of Initial Data for Furnace Modelling, Academy of Finland, 2003-2004, 120 000 €
- Modelling of belt sintering process, Outotec/TEKES, 2003-2005, 84 000 €

Instructor for Doctoral thesis, completed:

1. Pasi Miikkulainen, Spray Formation of High Dry Solids Black Liquor in Recovery Boiler Furnaces, former Helsinki University of Technology, passed with distinction, 2006

Instructor for Licentiate and Master’s thesis, completed:

1. Jaakko Savolahti, Behavior of mercury from coal, bio-fuels and wastes during pyrolysis and combustion, Licentiate thesis, 2007
2. Aki Kärnä, Drying of Chromite Pellets, “Pro-Gradu” –work, University of Oulu, 2004
3. Oskar Karlström, Determining fuel specific parameters for modeling of biomass particle combustion, Master’s thesis, Åbo Akademi University, 2007
4. Ville-Valtteri Visuri, Thermodynamics of slag formation in an AOD process model, Master’s thesis, University of Oulu, 2011
5. Kaisu Malinen, Controlled combustion of poor quality gas mixtures, Master’s thesis, Aalto University, 2006
6. Mohammad Hasan, Biomass based oxyfuel combustion in CHP power plant with opportunity of oxygen storage system for carbon capture and storage, Master’s thesis, Aalto University, 2012
7. Nadakumar Valivelu, Design of black liquor splash-plate nozzles, Master’s thesis, Aalto University, 2013

Supervisor(S) / Instructor (I) for Doctoral students, on-going:

1. Arshe Said, Fixation of CO₂ in mineral carbonation, to be finished 6/2015, Aalto University (S)
2. Thomas Kohl, Biorefineries as Innovative Integration Strategy for Future Communal CHP Plants Technology Assessment, Environmental Impact and Costs, Aalto University (S), to be finished 12/2014
3. Laura Kainiemi, Opportunities for Carbon Dioxide Capture and Storage, to be finished 2015, Aalto University (S)
4. Jonatan Skagersten, "Behaviour of Heavy Metals from Solid Wastes in Fluidized Bed Reactor" to be finished 2017, Aalto University (S)
5. Ville-Valtteri Visuri, "Phenomena-based modelling of AOD process", to be finished in 2014, University of Oulu (I)
6. Aki Kärnä, "CFD modeling of lance blowing in metallurgical processes", to be finished 2015, University of Oulu (I)
7. Jens Kohlmann, Carbon Sequestration by mineral carbonization", to be finished 2017
8. Antti Arasto, Techno economic evaluation of significant CO₂ emission reductions in iron and steel industry, to be finished 2015

Instructor for Licentiate and Master's thesis, on-going:

1. Jose Tamayo, The economical feasibility of different applications of solar energy, Licentiate Thesis, Aalto University, 2/2014
2. Timo Hast, Rakennusten energiakulutuksen aluejakauman määrittäminen, Aalto University, 2013

Leadership in research work:

- Detailed model development for the combustion of a single black liquor droplet, TEKES, Andritz, Åbo Akademi, project manager and researcher
- Black liquor spraying measurements on 6 recovery boilers, TEKES, Andritz, Metso, project manager and researcher
- Experimental work on composting watering optimization, YTV, project manager and researcher
- Detailed modeling of the processes of single iron-chromite pellets including drying, char conversion and oxidation/reduction behaviour of iron, TEKES, Outotec, University of Oulu, project manager and researcher
- Discrete particle CFD sub-model development for black liquor droplet combustion, TEKES, Academy of Finland, Andritz, Metso, International paper, UPM, Åbo Akademi, project manager and researcher
- Detailed modeling of the bubble growth in superheated viscous liquids, TEKES, Academy of Finland, project manager and researcher
- Detailed gas-liquid reaction model development for AOD process, TEKES, Outokumpu Stainless, University of Oulu, project manager and researcher
- Process model development for AOD process, TEKES, Outokumpu Stainless, University of Oulu, project manager and researcher
- Two-phase flow model development of flashing black liquor in nozzles, TEKES, Andritz Oy, Metso Power, project manager and researcher
- Process model development for CAS-OB process, TEKES, Fimecc-SHOK, Outokumpu Oy, Ruukki Metals Oy, University of Oulu, project manager and researcher

- Environmental Protection by Crushing Numbers - Towards the Next Generation Process Simulators for Energy, Materials and Economy Efficient Processes, Academy of Finland, Fimecc SHOK, Academy Research Fellow, 2012-2017, Principal investigator
- BioSCWG - Biomass Supercritical Water Gasification Integration with CHP units - Definition of novel social & political constraints for enlarged multi-objective optimization, Academy of Finland, SusEn Academy Research Project, 2013-2015, Co-operation with CNPq/University of Sao Paulo, Åbo Akademi, Principal investigator

8. Merits in teaching and pedagogical competence (if required, complement by submitting a teaching portfolio)

Lappeenranta University of Technology

- Combustion engineering. Teaching assistant, 1995. Responsible of all calculation exercises, design, organization and carrying out of laboratory experiments, simulation exercises

Helsinki University of Technology

- ENE47-160 Wind energy engineering, Assistant, 2003-5
- ENE47-154 Life Cycle Analysis, Assistant, 2003-5
- ENE47-122 Individual Assignment and Seminar on Thermal Turbomachines, coordinator, 2003-4, course with KTH/Sweden
- ENE47-126 Individual Assignment and Seminar on Steam Boilers, coordinator, 2003-4, course with KTH/Sweden
- ENE-58.010 Introduction to Energy Engineering, 2003-4. Lectures and exercises.
- ENE47-132 Combustion and Gasification, lectures on Kraft Recovery Boilers, Helsinki University of technology, 2004-2009

Åbo Akademy University

- Black liquor spraying lectures on the course “Chemistry in Combustion Processes II”, Åbo Akademi University, 2006-7

Industrial teaching

- Kinetics of metallurgical processes, in Finnish: Metallurgisten prosessien kinetiikka, POHTO course, 19-20.4.2005, Key note lecture on industrial course

9. Awards, prizes and honours

Best Dissertation of the Department of Machine Technology, 2002, former Helsinki University of Technology, “Järvinen, M., P., Numerical Modeling of the Drying, Devolatilization and Char Conversion Processes of Black Liquor Droplets, Acta Polytechnica Scandinavica, Mechanical Engineering Series No. 163, Espoo 2002, 77 p.”

10. Other academic merits

Journal referee

- FUEL (10), Applied pyrolysis (2), Biomass and Bioenergy (2)

Assessments for academic posts

- Academy of Finland young doctor, 2003-2005
- Academy of Finland Research fellow, 2012-2017

Member of the Scientific Committees for Conferences

- Finnish-Swedish Flame Days 2002 Conference, Committee Secretary
- Finnish-Swedish Flame Days 2008 Conference, Committee member
- Swedish-Finnish Flame Days 2011 Conference, Committee member
- Finnish-Swedish Flame Days 2013 Conference, Committee member
- Tekniikan päivät 2010- TULI. (Technology Days 2010 – FIRE), Energy sector organizer.

International Flame Research Foundation

- Secretary of the Finnish National Committee, 2001-2004
- Represent of the Aalto University, 2001-2013

11. Scientific and societal impact of research

Presence in the media

- “Tutkin miten mustalipeä palaa”, Helsingin sanomat, 24.5.2011
- Digitaalisesti tuotteet syntyvät nopeammin”, TEK-Lehti, 2.12.2011
- Materia, 1/2012, p. 34
- Fimecc SHOK, best result project of the year 2009 in ELEMET program
- “FIMECC revolutionizes steel developing: The strength of the steel converter is in simplicity”, Video on the Steel Converter Simulator model, <http://www.fimecc.com/video/results>

Total number of publications, **23** journal articles, H-index = **3.33**

~**30** Presented conference papers

Most cited articles

- Järvinen, M.P., Zevenhoven, R. and Vakkilainen, E. K. Auto-Gasification of a Biofuel, *Combustion and Flame*, 131:357-370 (2002)
- Järvinen, M.P., Zevenhoven, R., Vakkilainen, E. K. and Forssén, M., Effective Thermal Conductivity and Internal Thermal Radiation in Burning Black Liquor Particles, *Combustion Science and Technology*, 175(5): 873-900 (2003)
- Järvinen, M., Mueller, C., Hupa, M. and Fogelholm, C. J. A CFD Applicable Discrete Combustion Model for Thermally Large Particles, *Progress in Computational Fluid Dynamics*, Vol. 11, No. 6, 2011
- Järvinen, M.P., Pisilä, S.E., Kärnä, A.V. and Fabritius, T. Fundamental Mathematical Model for AOD Process. Part I: Derivation of the model. *Steel research international*, Volume 82, Issue 6, June, pp. 638–649 (2011)

- Pisilä, S.E., Järvinen, M.P., Kärnä, A.V. and Fabritius, T. Fundamental Mathematical Model for AOD Process. Part II: Model validation. Steel research international, Volume 82, Issue 6, June, pp. 650–657 (2011)
- Järvinen, M., Kärnä, A. and Fabritius, T. A Detailed Single Bubble Reaction Sub-Model for AOD Process, Steel Research International 80, No. 6, pp. 431-438 (2009)