

Andrej HORVAT

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Summary

Engineering consultant in a wide variety of fluid dynamic, heat and mass transfer, and CFD applications. Specializing in multiphase flow analysis, reacting flows, oil and gas, nuclear installations and renewable energy devices. Interested in engineering analysis and design projects in the energy sector, process and chemical industry, construction sector and transportation.

Specialties: Thermodynamics, Fluid Mechanics, Heat and Mass Transfer, Computational Fluid Dynamics (CFD), Structural analysis, Computational Modelling and Simulations

Education

M.Sc.	Mechanical Engineering (Heat and Mass Transfer) University of California, Los Angeles	2002
Ph.D.	Nuclear Engineering (Nuclear Technology) University of Ljubljana, Slovenia	2001
M.Sc.	Nuclear Engineering (Nuclear Technology) University of Ljubljana, Slovenia	1998
Dipl. -Ing.	Mechanical Engineering (Power and Process Engineering) University of Maribor, Slovenia	1995

Professional Experience

Managing Director: Caspus Engineering Ltd. 2011 - present

- [Fluids and thermal engineering design and analysis services](#)
 - [Computational Fluid Dynamics \(CFD\) and structural analysis](#)
 - [Fusion engineering and high energy systems](#)
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- Principal Engineer:** Intelligent Fluid Solutions Ltd. 2009 - 2011
- Managing sales process: customer prospecting, qualification, sales visits and communication, proposal preparation, project delivery and support
 - Lead technical side of consultancy projects
 - Project and product development management
- Senior Design Engineer:** Intelligent Fluid Solutions Ltd. 2007 - 2009
- Limited sales activities e.g. proposal preparation, customer communication, project delivery and support
 - Various development and consultancy projects e.g. wind farm layout optimization, fluid-structure interaction, vortex induced vibration, wind turbine simulation, heating and cooling applications, hydrogen production facility design etc.
- Technical Services Consultant:** ANSYS Europe Ltd. 2006 - 2007
- Various consultancy projects e.g. combustion of biofuel, LES model validation, erosion modelling, Reynolds stress model customization, chemical reactor simulation
 - Support of the ANSYS CFX, Design Modeler, ICEM CFD users
 - Training of ANSYS users
 - Preparation of pre-sales material
- Research Fellow:** ANSYS Europe Ltd. 2003 - 2006
- Developing algebraic and CFD models for analysis of fire phenomena: flashover and fire spread simulations, wood degasification, pyrolysis and combustion, gravity currents and backdraft
 - Fluid flow and heat transfer modelling using transient RANS and LES models
 - Support of the ANSYS CFX, Design Modeler, ICEM CFD users
 - Training of ANSYS users
 - Preparation of pre-sales material
- Research Associate:** Jozef Stefan Institute, Reactor Engineering Division 2001 - 2006
- Developing and modelling of water-hammer shocks propagation in NPP systems
 - Development of semi-analytical models using Galerkin method
 - Thermo-hydraulic heat exchanger analysis using LES and DNS models
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Managing Director: Horvat SP - International standardization and technical regulations 2000 - 2002

- Assisting ISO9000 certification process
- Advising in the area of international standardization and technical regulations
- Selling point for technical documentation (e.g. legal documents and standards)
- Managing administrative and commercial side of the business

Research Assistant: University of California at Los Angeles, Morrin-Martinelli-Gier Memorial Heat Transfer Laboratory 1999 - 2001

- Optimization of cooling surfaces for heat transfer enhancement
- Modelling of conjugate heat transfer problems related to electronics cooling
- Heat exchangers' tube vibrations: test section specification and design

Research Assistant: Jozef Stefan Institute, Reactor Engineering Division 1995 - 2001

- Safety analysis of design accident scenarios using RELAP code
- Severe accident safety analysis (steam explosions, lower plenum cooling)
- Review of technical specification for NPP steam generator replacement
- Inspection of safety and protection systems in NPP

Projects

Combustion & Process engineering

- CFD analysis of blast furnace operation
- Thermal analyses and sensitivity study of pyrolysis reactor equipment
- Validation of Reynolds stress models in a combustion chamber
- AFTUR: Alternative fuels for industrial gas turbines (EU project)

Consumer goods

- Analysis of thermostatic shower valves
 - Development of a novel baby bottle concept
 - Modelling of the PCM solidification process in a baby bottle warmer
 - Mechanically powered light - development and evaluation of the design concepts
 - Design of a compact fan system with heat recuperation
 - Melting of phase-change material using microwaves
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Fusion Engineering

- Thermo-mechanical analysis of ITER residual ion dump
- Structural assessment of ITER microwave heating antenna
- Blow-out transient simulation for ITER NBDI duct liner

General industrial

- Development of a cooling configuration for a high power electric motor
- Analysis and design development of a Peltier-based cooling system
- Fluid-structure interaction analysis of shield deflection of a microwave antenna
- Thermal performance of air heaters in the aircraft ventilation system
- Fluid-structure interaction analysis of an air heater due to thermal stresses
- Thermal management within a Chemical Warfare Agent (CWA) detector
- Particle behaviour in an agricultural spreader system and their ground surface distribution

HVAC & Fire safety

- CFD analysis of the Kings' cross accident
- FireNet: under-ventilated compartment fires (EU project)
- Influence of thermal radiation on ventilation conditions in a building
- Thermal loads due to a fire on a cargo ship
- Safedor: design, operation and regulation for safety
- Computational models for prediction of fire behaviour (training)
- External airflow and its impact on the building ventilation
- Evaluation of an alternative HVAC strategy using phase-change materials
- Design validation of a clean room air handling system
- Thermo-hydraulic analysis of a novel domestic heating system

Marine

- Wake formation behind the submarine fin and analysis of the resulting structural loads
- Development of cooling configuration for a battery compartment of a rigid inflatable boat
- Analysis of buffeting flow and its control on a high speed boat
- Water stability of a boom towing device

Medical

- Engineering review of inhaler technology and atomisation methodologies
 - Flow characteristics and film clearing potential of a novel endoscope attachment
 - Droplets behaviour and concept design development of a spray measuring device
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Nuclear

- Simulation of natural convection in fluids with internal heat generation
- Development of design criteria for fluid induced vibrations in heat exchangers
- WAHALoads: Two-phase flow water hammer transients and induced loads on materials and structures of nuclear power plants (EU project)
- Original combined multiphase model of steam explosion premixing phase
- Fluid-elastic instability in heat exchanger tube bundles
- Thermal loads on the reactor vessel lower plenum during a severe accident
- Determination of morphological parameters for optimization of heat exchanger surfaces

Oil & Gas

- Assessment & development of a novel borehole device
- Assessment of erosion in a drill-head for oil-wells
- Vortex induced vibration of a deep water riser
- Concept design of a supersonic gas compressor
- Analysis of a cold plasma methane cracking reactor and carbon removal process
- Feasibility assessment of vibration energy harvester

Renewable energy

- Validation of a CFD methodology to analyse wind turbine blades
- Simulation of wind turbine operation using blade element method
- Optimisation of a wind farm layout
- Forecasting of heat extraction rate for a ground source heating system
- Hydraulic design of ground source heat exchanger
- Setup of borehole temperature monitoring
- Analysis of a thermal storage system for a solar power plant module

Publications

Journal articles

Microwave melting process - model development and validation, in preparation

Particle behaviour on the fertilizer spreader and their ground surface distribution, in preparation

Guigay, G., Eliasson, J., Horvat, A., Sinai, Y., [Semi-Analytical and CFD Calculation of Gravity Flows in Backdraft Studies](#), Fire Technology, 2009, Vol. 45, pp. 323-340.

Horvat, A., Sinai, Y., Pearson, A., Most, J.-M., [Contribution to Flashover Modelling: Development of a Validated Numerical Model for Ignition of Non-Contiguous Wood Samples](#), Fire Safety J., 2009, Vol. 44, No. 5, pp. 779-788.

Horvat, A., Sinai, Y.L., Tofilo, P., [Numerical Prediction of Heat Fluxes in Underventilated Fire](#), Num. Heat Transfer, Part A, 2009, Vol. 55, Issue 6, pp. 517-533.

Pérez-Jiménez, C., Horvat, A., Sinai, Y., Guigay, G., Eliasson, J., Franssen, J.-M., [Influence of Obstacles on the Development of Gravity Current Prior to Backdraft](#), *Fire Technology*, 2009, Vol. 45, No. 3, pp. 323-340.

Gale, J., Tiselj, I., Parzer, I., Horvat, A., [Two-Fluid Model of the WAHA Code for Simulation of Water Hammer Transients](#), *Multiphase Science and Technology*, 2008, Vol. 20. Issue 3-4, pp. 291-322.

Tiselj, I., Horvat, A., Gale, J., Parzer, I., [Numerical Scheme of the WAHA Code](#), *Multiphase Science and Technology*, 2008, Vol. 20. Issue 3-4, pp. 323-354.

Horvat, A., Sinai, Y.L., Gojkovic, D., Karlsson, B., [Numerical and Experimental Investigation of Backdraft](#), *Comb. Science and Tech.*, 2008, Vol. 180, No. 1, pp. 45–63.

Horvat, A., Sinai, Y.L., [Numerical Simulation of Backdraft Phenomena](#), *Fire Safety J.*, 2007, Vol. 42, Issue 3, pp. 200-209.

Horvat, A., Mavko, B., [Momentum and Heat Transfer in a Bundle of Wing-Shaped Tubes](#), *J. Heat Transfer, Trans ASME*, 2006, Vol. 128, pp. 970-973.

Galgano, A., Di Blasi, C., Horvat, A., Sinai, Y., [Experimental Validation of a Coupled Solid- and Gas-Phase Model for Combustion and Gasification of Wood Logs](#), *Energy and Fuels*, July, 2006.

Horvat, A., Mavko, B., [Heat Transfer Conditions in Flow Across a Bundle of Cylindrical and Ellipsoidal Tubes](#), *Num. Heat Transfer, Part A*, 2006, Vol. 49, pp. 699–715.

Horvat, A., Leskovic, M., Mavko, B., [A Comparison of Heat Transfer Conditions in Tube Bundle Cross-Flow for Different Forms of Tubes](#), *Int. J. Heat Mass Transfer*, 2006, Vol. 49, 5-6, pp. 1027-1038.

Horvat, A., Mavko, B., Catton, I., [The Galerkin Method Solution of the Conjugate Heat Transfer Problems for the Cross-Flow Conditions](#), *J. Mech. Eng.*, 2005, 51, 7-8, pp. 527-533.

Horvat, A., Mavko, B., [Calculation of Conjugate Heat Transfer Problem with Volumetric Heat Generation Using the Galerkin Method](#), *J. Applied Math. Modelling*, 2005, 29, pp. 477-495.

Horvat, A., Mavko, B., [Hierarchic Modeling of Heat Transfer Processes in Heat Exchangers](#), *Int. J. Heat Mass Transfer*, 2005, 48, pp 361-371.

Tiselj, I., Horvat, A., Mavko, B., Pogrebnjak, E., Mosyak, A., Hetsroni, G., [Wall Properties and Heat Transfer in Near-Wall Turbulent Flow](#), *Num. Heat Transfer, Part A*, 2004, 46, pp. 717-729.

Horvat, A., Catton, I., [Application of Galerkin Method to Conjugate Heat Transfer Calculation](#), *Num. Heat Transfer, Part B: Fundamentals*, 2003, 44, pp. 509-531.

Horvat, A., Catton, I., [Numerical Technique for Modeling Conjugate Heat Transfer in an Electronic Device Heat Sink](#), *Int. J. Heat Mass Transfer*, 2003, 46, pp. 2155-2168.

Horvat, A., Catton, I., [An Analysis of Conjugate Heat Transfer in an Electronic Chip Heat Sink](#), *J. Mech. Eng.*, 2002, 9, pp. 482-490.

Horvat, A., Kljenak, I., Marn, J., [Two-Dimensional Large Eddy Simulation of Natural Convection Due to Internal Heat Generation](#), *Int. J. Heat Mass Transfer*, 2001, 44, pp. 3985-3995.

Horvat, A., Kljenak, I., Marn, J., [On Incompressible Buoyancy Flow Benchmarking](#), *Num. Heat Transfer, Part B: Fundamentals*, 2001, 39, pp. 61-78.

Books chapters

Horvat, A., Rizzi, M., Catton, I., [Advanced Computational Methods in Heat Transfer VII: Numerical Investigation of Chip Cooling Using Volume Averaging Technique \(VAT\)](#), WIT Press, Southampton, UK, 2002, pp. 373-382.

Horvat, A., Kljenak, I., Marn, J., [Advanced Computational Methods in Heat Transfer V: Numerical Prediction of Cooling Margins for a Fluid with Internal Heat Generation](#), WIT Press, Southampton, UK, 1998, pp. 17-19.

Conference presentations and proceedings

Horvat, A., de Souza, A., [Layout Optimisation Brings Step Change in Wind Farm Yield](#), All Energy 2009 Conference and Exhibition, May 19-20, 2009, Aberdeen, Scotland.

Horvat, A., Kyte, A., [A Fully Coupled Numerical Analysis of the Response of a Circular Membrane to High Wind Loads](#), ANSYS UK User Conference 2008 "Inspiring Engineering", Oxford, UK, Oct. 29-30, 2008, Proceedings.

Hartwanger, D., Horvat, A., [3D Modelling of A Wind Turbine Using CFD](#), NAFEMS UK Conference 2008 "Engineering Simulation: Effective Use and Best Practice", Cheltenham, UK, June 10-11, 2008, Proceedings.

Horvat, A., Sinai, Y., [Computational Prediction of Fire Spread to a Solid Material with ANSYS CFX](#), European Built Environment CAE Conference (EBECC 2008), London, UK, June 5-6, 2008, Proceedings.

Horvat, A., Mavko, B., [Numerical Investigation of Natural Convection Heat Transfer in Volumetrically Heated Spherical Segments](#), Int. Conf. "Nuclear Energy for New Europe 2004", Portorož, Slovenia, Sept. 6-9, 2004, Proceedings, No. 408.

Horvat, A., Mavko, B., Catton, I., [The Galerkin Method Solution of the Conjugate Heat Transfer Problems for the Cross-Flow Conditions](#), Proceedings, The ASME-ZSIS Int. Thermal Science Seminar II, Bled, Slovenia, June 13-16, 2004, pp. 951-958.

Tiselj, I., Horvat, A., Mavko, B., Pogrebnyak, E., Mosyak, A., Hetseroni, G., [Effect of Wall Thermal Properties on the Mean Temperature Profile in Near-Wall Turbulence](#), Turbulence, Heat and Mass Transfer 4, K. Hanjalic, Y. Nagano, M. Tummers (Editors), Begell House, 2003.

Tiselj, I., Gale, J., Horvat, A., Parzer, I., [Characteristic and Propagation Velocities of the Two-Fluid Models](#), The 10th Int. Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-10), Seoul, Korea, October 5-9, 2003, Proceedings.

Horvat, A., Sinai, Y.L., [Validation of Two-Equation Turbulence Models for Heat Transfer Applications](#), 8th UK National Heat Transfer Conference, Oxford, Sept. 9-10, 2003, Proceedings.

Horvat, A., Catton, I., [Modeling of Forced Convection in an Electronic Device Heat Sink as Porous Media Flow](#), 2002 ASME International Mechanical Engineering Congress and Exposition, November 17-22, 2002, New Orleans, LA, USA, Proceedings, IMECE2002/HTD-34246.

Horvat, A., Končar, B., [Hierarchic Modeling of Heat Exchanger Thermal Hydraulics](#), Int. Conf. "Nuclear Energy for New Europe 2002", Kranjska Gora, Slovenia, Sept. 9-12, 2002, Proceedings, No. 209.

Horvat, A., Catton, I., [Modeling of Conjugate Heat Transfer Using Galerkin Approach](#), Proceedings, International Symposium on Compact Heat Exchangers, Grenoble, France, Aug. 24, 2002, pp. 191-197.

Tiselj, I., Horvat, A., [Accuracy of the Operator Splitting Technique for Two-Phase Flow With Stiff Source Terms](#), The ASME Fluids Engineering Division Summer Meeting 2002, Montreal, Canada, July 13-19, 2002, Proceedings, FEDSM2002-31349.

Horvat, A., Catton, I., [Development of an Integral Computer Code for Simulation of Heat Exchangers](#), Nuclear Energy in Central Europe 2001, Portorož, Slovenia, Sept. 10-13, 2001, Proceedings, No. 213.

Horvat, A., Kljenak, I., Marn, J., [Dynamics of Heat Transfer in the Melt Pool at Nuclear Severe Accident Conditions](#), The 1999 ASME International Mechanical Engineering Congress and Exposition, Nashville, Tennessee, USA, Nov. 14-19, 1999, Proceedings, pp. 285-292.

Horvat, A., Kljenak, I., Marn, J., [Dynamic Behavior of the Melt Pool at Severe Accident Conditions](#), The 1999 NURETH-9 Conference, San Francisco, California, USA, Oct. 3-8, 1999, Proceedings, pp. 1-15.

Horvat, A., Kljenak, I., Marn, J., [Numerical Estimation of Reactor Core Melt Cooling](#), Transactions of the American Nuclear Society, La Grange Park, Illinois, USA, American Nuclear Society, 1998, Vol. 79, pp. 380-381.

Horvat, A., [Testing the Numerical Method for One-Dimensional Shock Treatment](#), The 5th Regional Meeting "Nuclear Energy in Central Europe", Čatež, Slovenia, Sept. 7-10, 1998, Proceedings, pp. 203-210.

Horvat, A., Kljenak, I., [Numerical Investigation of Turbulent Natural Convection in Reactor Pressure Vessel Lower Plenum During Meltdown Scenario](#), The 4th Regional Meeting "Nuclear Energy in Central Europe", Bled, Slovenia, Sept. 7-10, 1997, Proceedings, pp. 43-50.

Horvat, A., Marn, J., Leskovar, M., [Mathematical Description of Multiphase Flow During Meltdown Scenario](#), The 3rd Regional Meeting "Nuclear Energy in Central Europe", Portorož, Slovenia, Sept. 16-19, 1996, Proceedings, pp. 237-245.

Marn, J., Leskovar, M., Horvat, A., [Evaluation of Steam Explosion \(ESE\): Premixing](#), The ASME Fluids Engineering Division Summer Meeting 1996, San Diego, California, USA, July 7-11, 1996, Proceedings FED-Vol. 236, pp. 167-172.

Horvat, A., Marn, J., [Short Overview of Steam Explosion Phenomena Research](#), Kuhljevi dnevi '95, Radenci, Slovenia, Sept. 21-22, 1995, Proceedings, pp. 167-174.

Invited lectures

Horvat, A., Hartwanger, D., [Application of Modelling Methods in Wind Turbine Engineering](#), Free Flow Turbines and Their Efficiency, May 6, 2011, University of Leicester, UK.

Horvat, A., [Streamlining Product Development using ANSYS CFD](#), Enhancing Engineering Productivity with Fast and Reliable CFD Solutions, April 12, 2011, Sheffield, UK.

Horvat, A., [Yoomi - CFD Driven Product Design](#), December 9, 2010, Webinar, ANSYS UK.

Horvat, A., [Yoomi - CFD Behind the Product](#), November 16, 2010, Webinar, ANSYS UK.

Horvat, A., [Fire Modelling in Computational Fluid Dynamics \(CFD\)](#), May 26, 2010, NAFEMS Webinar Series.

Horvat, A., [Computational Models for Prediction of Fire Behaviour](#), January 17, 2008, Society of Fire Protection Engineers, Ig, Slovenia.

Sinai, Y., Horvat, A., [Methods & Development in CFD Modelling of Fire](#), May 22, 2003, Greenwich University, London, UK.

Mavko, B., Parzer, I., Horvat, A., [Recent CAMP Activities in Slovenia](#), Fall 2001 CAMP Meeting, Oct. 31 - Nov. 1, 2001, Alexandria, VA, USA.

Monographs and other completed works

Horvat, A., [Calculation of Conjugate Heat Transfer in a Heat Sink Using Volume Averaging Technique \(VAT\)](#), M.Sc. Thesis, The Mechanical and Aerospace Engineering Department, University of California, Los Angeles, USA, 2002.

Horvat, A., [Modeling of Turbulent Natural Convection in a Fluid with Internal Heat Generation with the Large-Eddy Simulation Method](#), Ph.D. Thesis, Faculty of Mathematics and Physics, University of Ljubljana, Slovenia, 2001.

Horvat, A., [Modeling of Natural Convection Phenomena in Nuclear Reactor Core Melt](#), M.Sc. Thesis, Faculty of Mathematics and Physics, University of Ljubljana, Slovenia, 1998.

Horvat, A., [Evolution of Vapor Explosion Theory and Modeling](#), Dipl.-Ing. Thesis, Faculty of Mechanical Engineering, University of Maribor, Slovenia, 1995.

