



ANDREAS THEODORAKAKOS

ASSOCIATE PROFESSOR
LABORATORY OF THERMO-FLUID SYSTEMS
DEPARTMENT OF MECHANICAL ENGINEERS
UNIVERSITY OF WEST ATTICA

SHORT CV

Personal information

Date of Birth: 4 February 1970

Nationality: Greek

Work address: Department of Mechanical Engineer,
University of West Attica (UNIWA)
Ancient Olive Grove Campus
250 Thivon & P. Ralli Str, Egaleo
Postal Code 12241, Athens

E-mail: atheod@uniwa.gr

Webpages: icelab.uniwa.gr
eclass.uniwa.gr/courses/MECH173/
eclass.uniwa.gr/courses/MECH175/

Education

1993 - 1998 *Ph.D, Fluid Department, Mechanical Engineering, National Technical University of Athens (N.T.U.A.)*
Ph.D. Thesis: "Numerical investigation of the inlet and compression strokes of reciprocal internal combustion engines"

1987 - 1992 *5-year Diploma in Mechanical Engineering, School of Mechanical Engineering, National Technical University of Athens, Greece*

Professional qualifications

1995 - Member of TEE (Greek Technical Chamber)

2001 - Member of SAE (Society of Automotive Engineers)

Languages

Greek: Native
English: Proficient

Employment record:

1992 – 1998 Research student, Fluids Section, National Technical University of Athens (NTUA), Greece.
1998 – 1999 Military service (Greek Army).
1999 – 2003 Research Assistant, NTUA.
1999 – 2012 Founder and Director of *Fluid Research Inc.*
2006 – 2012 Teaching Assistant in Technological Institution (TEI) of Piraeus, Greece.
2012 – 2017 Assistant Professor in the Department of Mechanical Engineer, University of West Attica (former Technological Institution (TEI) of Piraeus), Greece.
2017 – Associate Professor in the Department of Mechanical Engineer, University of West Attica, Greece.

Teaching (Undergraduate and Post-Graduate)

Department of Mechanical Engineer, University of West Attica (Former Technological Institution (TEI) of Piraeus)

2006 – Internal Combustion I (Theory and Laboratory)
2006 – Internal Combustion II (Theory and Laboratory)
2016 – 2018 Laboratory of Industrial Automation Systems
2021 – 2022 Fluid Mechanics II
2020 – “Msc by Reasearch in Thermofluids”: Computational Fluid Dynamics
2020 – “Msc by Reasearch in Thermofluids”: Transport Phenomena Simulation
2021 – “Msc by Reasearch in Thermofluids”: Differential Equations Of Transport Phenomena

Research Interest:

Computational fluid dynamics in complex domains, Multi-phase flows, Phase-change processes, Fuel cells, Environmental flows, Cavitation, Fuel Systems, IC engines.

Participation in EU and Industrial Funded Projects (at NTUA):

1. JOULE 1, JOUE0083: Spray aerodynamic interaction for improved efficiency and reduced carbon dioxide emissions.
2. NTUA Research Contract No. 197696, Ford Motor Company Ltd, "The flow and droplet distribution in a 4 - valve port injected gasoline engine during induction and compression strokes".
3. JOULE 2, JOU20330: Energy efficiency in transport including suitable substitutes for conventional fuels.
4. JOULE 2, JOU20370: Improving techniques for statistical and physical modelling of wind resource in complex terrain.
5. 7210-CA/702, Steel Research Work program: Improvement of Cast Product Quality by Using Results From Mathematical and Physical Modeling of the Continuous Casting Process.
6. 4th FWP, JOF3970028: Spray Formation for Direct Injection Engines.
7. 4th FWP, JOF3970031: Direct Injection Stratified Charge Engine Technology For Europe.
8. 4th FWP, ENK6-2000-00051: Droplet-wall-interaction phenomena of relevance to direct injection gasoline engines (DWDIE).

Participation in Industrial and Greek-State Research Contracts (Private Consulting):

1. 1998, Ford Motor Company, Aachen, Germany: Development of 1-D Fuel Injection Equipment Model
2. 2000, Rokas AE, Greece: CFD Simulation of wind distribution over terrains for identification of optimum location for wind-turbines park
3. 2001-2003, Yamaha Motor Company, Japan: Flow and spray simulation in gasoline direct injection motorcycle engines
4. 2002-2003, Siemens Automotive VDO, Italy: Flow simulation in outwards-opening pintle piezo injector nozzles
5. 2003-2004: Toyota Motor Engineering and Manufacturing Europe, Belgium: Flow simulation in automotive Diesel fuel injector nozzles
6. 2005, Daimler-Chrysler AG, Germany: Optimisation of the design of a cavitating Diesel fuel valve
7. 2004-2005, Toyota Motor Engineering and Manufacturing Europe, Belgium: Development of CFD methodology for droplet formation and wall detachment in fuel cells.
8. 2003-2005, Greek-State Research Contract: Development of wind atlas for the Viotia and Fthiotida Prefectures.

9. 2005-2006, Caterpillar Fuel Systems, USA: Simulation of cavitating flow and surface erosion in heavy-duty Diesel injector nozzles
10. 2005-2007: Greek State Research Contract: Development and validation of system software for the prediction of the short-time-scale energy production, demand and distribution.
11. 2006-2008, Greek-State research Contract: Numerical simulation of flow inside porous materials used with heat exchangers and fuel cells.
12. 2006, Woodward Diesel Systems, UK: Simulation of cavitation and erosion damage in a low pressure fuel delivery pump.
13. 2006-2007, Delphi Diesel Systems, UK: Distribution of cavitation model for Diesel injector nozzles.
14. 2006-2008, Toyota Motor Europe, Belgium: Simulation of aerodynamic behavior of flapping wings mimicking the bee flight.
15. 2008-2010, Toyota Motor Europe, Belgium: Simulation of electrochemistry and thermal heating of the Prius hybrid vehicle battery.
16. 2006-2008, The Heart Centre, Greece: Flow simulation in coronary flow arteries.
17. 2008, Delphi Diesel Systems, UK: Simulation of cavitation in automotive Diesel injector nozzles.
18. 2008, Caterpillar, UK: Simulation of cavitation and erosion in heavy-duty Diesel injector nozzles.
19. 2009, RWE, Germany: Simulation of thermal pollution in the Porto Romano coastal gulf.
20. 2010, The Heart Centre, Greece: Flow simulation in coronary arteries with stent.
21. 2011, Caterpillar Fuel Systems, USA: Simulation of cavitating flow and surface erosion in heavy-duty Diesel injector nozzles
22. 2010-2012, Delphi Diesel Systems, UK: Simulation of cavitation in automotive Diesel injector nozzles.

Participation in Industrial and Greek-State Research Contracts (at UNIWA):

1. 2015-2016, DEPA “Support Services for CNG professional workshops training”.
2. 2020-2021, ESPA, Human Resources Development, Education and Lifelong Learning, “Magnetic Navigation of Nanoparticles inside Human Arteries”.

Publications:

43 papers in peer-review Journals.

46 papers in peer-review transactions or international conferences.

4 papers in Greek national conferences.

2 invited papers.

Scopus: (10/2022, self-citation of all authors excluded)

Citations: 1652

h index: 23

Journal Publications

1. Karvelas E.G., Liosis C., *Theodorakakos A.*, Sarris I, Karakasidis T. E., (2021), "An Optimized Method for 3D Magnetic Navigation of Nanoparticles inside Human Arteries", *Fluids* 2021, 6(3), 97.
2. Karvelas E.G., Liosis C., *Theodorakakos A.*, Karakasidis T. E., (2021), "An optimized method for 3D magnetic navigation of nanoparticles inside human arteries", *International Journal of Biomedical and Biological Engineering* Vol:15, No:1, 2021.
3. Koukouvinis, P., Strotos, G., Zeng, Q., Gonzalez-Avila, S.R., *Theodorakakos, A.*, Gavaises, M., Ohl, C.-D., (2018), "Parametric Investigations of the Induced Shear Stress by a Laser-Generated Bubble", (2018) *Langmuir*, 34 (22), pp. 6428-6442.
4. Kopanidis A., Pantos I., Alexopoulos N., *Theodorakakos A.*, Eustathopoulos E., Katritsis D. (2015), "Aortic Flow Patterns After Simulated Implantation of Transcatheter Aortic Valves", *Hellenic J Cardiol* 2015; 56: 418-428.
5. Kopanidis A., Pantos I., *Theodorakakos A.*, Tzanalaidou E., Katritsis D. (2015), "Fractional flow reserve derived from conventional coronary angiograms and computational fluid dynamics", *Int. J. of Cardiology*. 2015;190:187-189.
6. Strotos G., Koukouvinis P., *Theodorakakos A.*, Gavaises M., Bergeles G., (2015), "Transient heating effects in high pressure Diesel injector nozzles", *Int. J. Heat and Fluid Flow* 17, 130 - 138.
7. *Theodorakakos A.*, Strotos G., Mitroglou N., Atkins C., Gavaises M., (2014), "Friction-induced heating in nozzle hole micro-channels under extreme fuel pressurisation", *Fuel* 123 143-150.
8. Katritsis D. G, *Theodorakakos A.*, Pantos I., Gavaises M., Karcianas N., Efstathopoulos E. P., (2012), "Flow Patterns at Stented Coronary Bifurcations Computational Fluid Dynamics Analysis", *Circ Cardiovasc Interv.* 2012;5:530-539.
9. Strotos G., Gavaises M., *Theodorakakos A.* and Bergeles G., (2011), "Numerical investigation of the evaporation of two-component fuel droplets", *Fuel* 90 1492-1507.
10. Nikolopoulos N., Strotos G., Nikas K. S., *Theodorakakos A.*, Gavaises M., Marengo M., and Cossali G. E., (2011), "Single droplet impacts onto deposited drops. Numerical analysis and comparison", *Atomization and Sprays* 20(11), pp. 935-953.
11. Strotos G., Aleksis G., Gavaises M., Nikas K-S., Nikolopoulos N. and *Theodorakakos A.*, (2011), "Non-dimensionalisation parameters for predicting the cooling effectiveness of droplets impinging on moderate temperature solid surfaces' *Int. J of Thermal Sciences* 50 698-711.

12. Nikolopoulos N., Strotos G., Nikas K. S., Gavaises M., *Theodorakakos A.*, Marengo M., and Cossali G. E., (2010), "Experimental investigation of a single droplet impact onto a sessile drop", *Atomization and Sprays* 20, pp. 909-922.
13. Kopanidis A., *Theodorakakos A.*, Gavaises E., and Bouris D., (2010), "3D Pore Scale 3D Modelling of Heat and Mass Transfer in the Gas Diffusion Layer and Cathode Channel of a PEM Fuel Cell", *Int. J of Thermal Sciences* 50 456-467.
14. Kopanidis A, *Theodorakakos A.*, Gavaises E., and Bouris D., (2010), "3D numerical simulation of flow and conjugate heat transfer through a pore scale model of high porosity open cell metal foam", *Int. J. Heat and Mass Transfer*, 53, pp. 2539-2550.
15. D. Katriasis, A. *Theodorakakos*, I. Pantos, A. Andriotis, E. P. Efstathopoulos, G. Siontis, N. Karcanias, S. Redwood and M. Gavaises, (2010) "Vortex formation and recirculation zones in left anterior descending artery stenosis: computational fluid dynamics analysis", *Phys. Med. Biol.*, 55, pp. 1395 – 1411.
16. Tonini S., Gavaises M., *Theodorakakos A.* and Cossali G.E., (2010) "Numerical Investigation of Multiple Injection on the Development of high-pressure Diesel Sprays", *Proc. IMechE, Part D: J. Automobile Engineering*, 2010, 224 (D1), 125-141. DOI 10.1243/09544070JAUTO1083.
17. Spathopoulou M., Gavaises M., *Theodorakakos A.* and Yanagihara H., (2009) "Formation and development of wall liquid films during impaction of gasoline fuel sprays", *Atomization and Sprays* 19 (8), pp. 701-726.
18. Nikolopoulos N., *Theodorakakos A.* and Bergeles G., (2009), "Off-centre binary collision of droplets: A numerical investigation", *Int. J. of Heat and Mass Transfer*, 52, pp. 4160-4174.
19. Gavaises M., Andriotis A., Papoulias D., Mitroglou N. and *Theodorakakos A.*, (2009) "Characterization of string cavitation in large-scale Diesel nozzles with tapered holes", *Physics of Fluids*, 21, Issue 5.
20. Tonini S., Gavaises M. and *Theodorakakos A.*, (2009), "The role of droplet fragmentation in high pressure evaporating Diesel sprays" *Int. J. of Thermal Sciences*, 48 (3), 554 – 572.
21. Giannadakis E., Papoulias D., Gavaises M. and *Theodorakakos A.* (2008) "Simulation of Cavitation in outwards opening pintle injectors", *Proc. IMechE, Part D*, 222, 1895-1910.
22. Strotos G., Gavaises M., *Theodorakakos A.* and Bergeles G., (2008), "Numerical investigation of the cooling effectiveness of a droplet impinging on a heated surface", *Int J Heat and Mass Transfer*, 51, 4728-4742.
23. *Theodorakakos A.*, Gavaises M., Andriotis A., Zifan A., Liatsis P., Pantos I., Efstathopoulos E. and Katriasis D., (2008), "Simulation of Cardiac Motion on non-Newtonian, Pulsating Flow Development in the Human Left Anterior Descending Coronary Artery", *Phys. Med. Biol.* 53, 4875-4892.
24. Tonini S., Gavaises M. and *Theodorakakos A.*, (2008), "Modelling of high-pressure dense Diesel sprays with adaptive local grid refinement", *Int J Heat and Fluid Flow*, 29, pp. 427-448.

25. Strotos G., Gavaises M., *Theodorakakos A.* and Bergeles G., (2008), "Numerical Investigation on the Evaporation of Droplets Depositing on Heated Surfaces at Low Weber Numbers", *Int. J. of Heat and Mass Transfer*, 51, pp. 1516-1529.
26. Andriotis A., Zifan A., Gavaises M., Liatsis P., Pantos I., *Theodorakakos A.*, Efstathopoulos E. and Katritsis D., (2008), "A New Method of Three-dimensional Coronary Artery Reconstruction From X-Ray Angiography: Validation Against a Virtual Phantom and Multislice Computed Tomography", *Catheterization and Cardiovascular Interventions*, 71, pp. 28-43.
27. Tonini S., Gavaises M., Arcoumanis C., *Theodorakakos A.* and Kometani S., (2007), "Multi-component fuel evaporation and its effect on spray development air-fuel mixing in a direct injection gasoline engines", *Proc. IMechE, Part D, Journal of Automobile Engineering*, volume 221, issue 10, pp 1321–1342.
28. Nikolopoulos N., *Theodorakakos A.* and Bergeles G., (2007), "Three – dimensional numerical investigation of a droplet impinging normally onto a wall film", *J. Comput. Phys*, 225, pp. 322-341.
29. Nikolopoulos N., *Theodorakakos A.* and Bergeles G., (2007), "A numerical investigation of the evaporation process of a liquid droplet impinging onto a hot substrate", *Int. J. of Heat and Mass Flow*, 50, pp. 303-319.
30. Gavaises M., Tonini S., Marchi A., *Theodorakakos A.*, Bouri D. and Matteucci L., (2006) "Modelling of internal and near-nozzle flow of pintle-type outwards opening gasoline piezo-injectors", *Int. J. Engine Research*, 7, No 5, pp 381-397.
31. *Theodorakakos A.*, Ous T., Gavaises M., Nouri J.M., Nikolopoulos N. and Yanagihara H., (2006), "Dynamics of water droplets detached from porous surfaces of relevance to PEM fuel cells", *J. of Colloids and Interface Science*, 300, pp. 673 - 687.
32. Petropoulou S., Gavaises M. and *Theodorakakos A.*, (2006), "An Adjoint Method for Hole Cavitating Control through Inverse Nozzle Design", *SAE Transactions Journal of Engines*, 115-3, pp. 505-513, No. 2006-01-0892, 2006.
33. Petropoulou S., Gavaises M. and *Theodorakakos A.*, (2006) "Adjoint method for controlled cavitation Inverse nozzle design", *Int. J. Automotive Technology*, 7, No. 3, pp. 283-288.
34. Nikolopoulos N., *Theodorakakos A.* and Bergeles G., (2005), "Normal Impingement of a Droplet onto a Wall Film: A Numerical Investigation", *Int. J. of Heat and Fluid Flow*, 26, pp. 119-132.
35. *Theodorakakos A.* and Bergeles G., (2004), "Simulation of Sharp Gas-Liquid Interface using VOF Method an Adaptive Grid Local Refinement around the Interface", *Int. J. for Numerical Methods in Fluids*, 45, pp. 421-439.
36. Gavaises M., Arcoumanis C., Choi Y. S. and *Theodorakakos A.*, (2004), "Nozzle flow and spray characteristics from VCO diesel injector nozzles", *Selected Papers from THIESEL 2002 Conference on Thermo- and Fluid-Dynamic Processes in Diesel Engines*, Whitelaw et al (eds), pp 31-48, Springer Verlag.
37. *Theodorakakos A.* and Bergeles G., (2001), "A Telescopic Local Grid Refinement technique for Wind Flow Simulation over Complex Terrain", *Wind Energy*, 4, pp. 77-98.

38. Panaras G. A., *Theodorakakos A.* and Bergeles G., (1998), "Numerical investigation of the Free Surface in a Continuous Steel Casting Mold Water Model", *Metallurgical and Materials Transactions B*, 29B, pp. 1117 - 1126.
39. *Theodorakakos A.* and Bergeles G., (1998), "Numerical investigation of the Interface in a Continuous Steel Casting Mold Water Model", *Metallurgical and Materials Transactions B*, 29B, pp. 1321 - 1327.
40. *Theodorakakos A.* and Bergeles G., (1997), "Numerical investigation of the flow inside a 4-X model diesel engine", *Entropie* no. 200, pp. 53 - 63.
41. Gavaises M., *Theodorakakos A.*, Bergeles G. and Brenn G., (1996), "Evaluation of the effect of droplet collisions on spray mixing", *Proc. IMechE, Part C*, 210, pp. 465 - 475.
42. Gavaises M., *Theodorakakos A.* and Bergeles G., (1996), "Modeling wall impaction of diesel sprays", *Int. J. Heat and Fluid Flow* 17, pp. 130 - 138.
43. *Theodorakakos A.* and Bergeles G., (1993), "Predictions of the in - cylinder fluid motion of a motored internal combustion engine", *Entropie* no. 174/175, pp. 7 - 14.

Pear-review transactions or international conferences

1. Karvelas E.G., Liosis C., *Theodorakakos A.*, Karakasidis T. E., (2021), "An optimized method for 3D magnetic navigation of nanoparticles inside human arteries", XV. International Conference on Drug Delivery Nanosystems for Biomedical Engineering Applications Rome Italy Jan 18-19, 2021, Part VI.
2. Strotos G., Malgarinos I., Nikolopoulos N., Papadopoulos K., *Theodorakakos A.*, Gavaises M., (2015), "Performance of VOF methodology in predicting the deformation and breakup of impulsively accelerated droplets", ICLASS 2015, 13th Triennial International Conference on Liquid Atomization and Spray Systems, Tainan, Taiwan, August 23-27, 2015.
3. *Theodorakakos A.*, Gavaises M., Pearson R., Gold M., (2015), "Influence of fuel composition on cavitation inception and further development in diesel fuel injectors", IMechE 2015, Fuel Systems for IC Engines, March 10-11, 2015, London.
4. Koukouvini P.K., Bergeles G., Li J.Z., Wang L., *Theodorakakos A.*, Gavaises M., (2015), "Simulation of cavitation inside diesel injectors, including erosion modelling", IMechE 2015, Fuel Systems for IC Engines, March 10-11, 2015, London.
5. Strotos G., Koukouvini P., *Theodorakakos A.*, Gavaises M., Wang L., Li J., McDavid R. M., (2014), "Fuel heating in high pressure diesel nozzles", Proceedings of THIESEL 2014, 9-12 September 2014, Valencia, Spain.
6. Strotos G., Koukouvini P., *Theodorakakos A.*, Gavaises M., (2014), "Quantification of Friction-induced Heating in tapered Diesel orifices", Proceedings of SIA 2014, 21-22 May 2014, Rouen, France, Paper No37.
7. *Theodorakakos A.*, Katritsis D.G., Pantos I., Gavaises M., Karcanias N. and Efsthopoulos E.P., (2014), "Flow Patterns at Stented Coronary Bifurcations: Computational Fluid Dynamics Analysis", International Scientific Conference eRA-9, Piraeus University of Applied Sciences, Greece. 2014.

8. *Theodorakakos A.*, Mitroglou N. and Gavaises M., (2013) "Simulation of heating effects caused by fuel pressurisation at 3000 bar in diesel fuel injectors". 11th engine combustion processes, Ludwigsburg, Germany, 2013.
9. *Theodorakakos A.*, Mitroglou N. and Gavaises M., (2012), "Simulation of heating effects caused by extreme fuel pressurisation in cavitating flows through Diesel fuel injectors", Proceedings of the 8th International Symposium on Cavitation, CAV2012 – Submission No. 216, August 13-16, 2012, Singapore.
10. Gavaises M., Mitroglou N. and *Theodorakakos A.*, (2012) "Cavitation simulation and experimental verification using a new Diesel nozzle design concept", SIA International Conference on Diesel Powertrains, Rouen, France; 06/2012.
11. Nikolopoulos N., Strotos G., Nikas K.S., *Theodorakakos A.*, Gavaises M., Marengo M., Cossali G.E., (2012), "Experimental and numerical analysis of the single droplet impact onto stationary ones", DIPSI Workshop 2012 on Droplet Impact Phenomena & Spray Investigation, May 18, 2012, Bergamo, Italy.
12. Tonini S., Gavaises M., *Theodorakakos A.* and Cossali G.E., (2010), "Modelling of spray injection from water mist fire suspension systems", 23rd Annual Conference on Liquid Atomization and Spray Systems, Brno, Czech Republic, September 2010.
13. Papoutsakis A., *Theodorakakos A.*, Giannadakis E., Papoulias D. and Gavaises M., (2009) "LES Predictions of the Vortical Flow Structures in Diesel Injector Nozzles", SAE paper 2009-01-0833.
14. Giannadakis E., Gavaises M., and *Theodorakakos A.*, (2009) "The Influence of Variable Fuel Properties in High – Pressure Diesel Injectors", SAE paper 09PFL-0158.
15. Kopanidis A., Bouris D., *Theodorakakos A.* and Gavaises E., (2008), "Direct Modeling of the Microscale Flow through a PEM Fuel Cell GDI and Channel", Proceedings of the 1st European Conference on Microfluidics, 10 – 12 December 2008 Bologna, Italy.
16. S. Tonini, M. Gavaises, A. *Theodorakakos* and E. Cossali, (2008), "Effect of in-cylinder air thermodynamic conditions on the development of multiple injection Diesel sprays", 22nd Conference on Liquid Atomization and Spray Systems (ILASS-Europe), Como, Italy, 9-12 Sept, 2008.
17. Gavaises M., Papoulias D., Giannadakis E., Andriotis A., Mitroglou M. and *Theodorakakos A.*, (2008), "Comparison of cavitation formation and development in Diesel VCO nozzles with cylindrical and converging tapered holes", THIESEL 2008 Conference on Thermo- and Fluid-Dynamic Processes in Diesel Engines, Valencia, Spain, 9 – 12 Sept, 2008.
18. G. Strotos, A. *Theodorakakos*, G. Bergeles and M. Gavaises "Influence of species concentration on the evaporation of suspended multicomponent droplets", ILASS 2008, Como, September 9-12, 2008.
19. Strotos G., Gavaises M., *Theodorakakos A.* and Bergeles G., (2008), "Evaporation of a suspended multi-component droplet under convective conditions", International Symposium on Computational Heat Transfer, Morocco, May 11-16, 2008.
20. Kopanidis A., Gavaises E., *Theodorakakos A.* and Bouris D., (2008), "Numerical Simulation of Fluid Flow and Heat Transfer with Direct Modeling of Microscale Geometry", 5th European Thermal - Sciences Conference, 18 – 22 May Eindhoven, the Netherlands.

21. Tonini S., Giannadakis E., Gavaises M., *Theodorakakos A.*, Cossali G.E. and M. Marengo M., (2007), "Effect of dwell time on multi-component fuel vaporization of high-pressure diesel sprays injected from cylindrical and reverse tapered multi-hole nozzles", Proc. 21th Conf. on Liquid Atomization and Spray Systems (ILASS), Sept 10-12, Mugla, Turkey, 2007.
22. Spathopoulou M., Papoulias D., Giannadakis E., Gavaises M. and *Theodorakakos A.* (2007), "Influence of the Spatially Resolved Nozzle Hole Exit Flow Distribution on Diesel Spray Development", Proc. 7th International Conference ICE2007 Internal Combustion Engines: Experiments and Modelling, Capri, Italy, Sept 17-20, 2007, SAE Paper 2007-24-0025.
23. Papoulias D., Giannadakis E., Mitroglou N., Gavaises M., and *Theodorakakos A.*, (2007) "Cavitation in Fuel Injection Systems for Spray – Guided Direct Injection Gasoline Engines", SAE paper 2007-01-1418.
24. Gavaises M., Papoulias D., Andriotis A., Giannadakis E., and *Theodorakakos A.*, (2007) "Link Between Cavitation Development and Erosion Damage in Diesel Injector Nozzles", SAE paper 2007-01-0246.
25. Gavaises M., Strotos G., *Theodorakakos A.* and Bergeles G., (2006) "Cooling effectiveness of water droplets falling on a flat plate", *Invited paper, DITICE workshop* on drop/wall interaction: Industrial applications, Experiments and Modelling, University of Bergamo, 19th May 2006, Italy
26. Alafouzou V., Vougiouka A., Perivolaris Y., Mourikis D., Zagorakis V., *Theodorakakos A.* (2006), "A Model for Estimating Wind Speed Profile in Complex Terrain Based on an Advanced CFD Tool", European Wind Energy Conference, Athens.
27. Mourikis D., Alafouzou V., Vougiouka A., Perivolaris Y., Zagorakis V., *Theodorakakos A.* (2006), "Numerical Investigation of Wind Resources in Complex Terrain Using an Advanced CFD Model: Test Cases for Three Hellenic Regions in the Prefectures of Viotia & Fthiotida", European Wind Energy Conference, Athens.
28. Tzotzolakis D., *Theodorakakos A.* and Bergeles G., (2006), "A Numerical Investigation of a Droplet Collision with a Hemispherical Static Droplet on a Solid Surface", 2nd International Conference IC-SCCE, Athens, Greece.
29. Tonini S., Gavaises M., Arcoumanis C. and *Theodorakakos A.*, (2006) "Prediction of Liquid and Vapor Penetration of High Pressure Diesel Sprays", SAE paper 2006-01-0242.
30. Petropoulou S., Gavaises M. and *Theodorakakos A.*, (2005) "An Adjoint method for controlled cavitation Inverse nozzle design", IPC-13 Int. Pacific Conference on Automotive Engineering, Paper No 360, August 22-24, Korea.
31. Bouris D., *Theodorakakos A.* and Bergeles G., (2005), "Large Eddy Simulation of Oblique Flow Past a Cubic Obstacle", Fourth International Symposium on Turbulence and Shear Flow Phenomena – 2005 TSFP-4, Virginia USA, June 27-29 2005.
32. Gavaises M., Tonini S., Arcoumanis C., Kometani S. and *Theodorakakos A.*, (2003), "Multi-component fuel vaporization and its effect on spray development and air-fuel mixing in gasoline direct injection engines", 5th International Conference ICE2003 Internal Combustion Engines: Experiments and Modelling, Capri-Naples, Italy, September 15-18.

33. Gavaises M., Arcoumanis C., Choi Y. S. and *Theodorakakos A.*, (2002), “Nozzle flow and spray characteristics from VCO diesel injector nozzles”, THIESEL 2002 Conference on Thermo- and Fluid-Dynamic Processes in Diesel Engines Valencia, Spain, 11 – 15 Sept, 2002.
34. *Theodorakakos A.* and Bergeles G., (2002), “Flow and Temperature Fields During Combustion in Diesel Engines”, 4th GRACM Congress on Computational Mechanics, University of Patras.
35. Gavaises M., Arcoumanis C., *Theodorakakos A.* and Bergeles G, (2001), “Structure of High Pressure Diesel Sprays”, 4th International Conference ICE2001 Internal Combustion Engines: Experiments and Modelling, Capri-Naples, Italy, September 23-26, 2001
36. *Theodorakakos A.* and Bergeles G., (1995), “Numerical investigation of the flow inside a helicoidal inlet port of a 4X I.C. engine”, 10th symposium on Turbulent Shear Flows, The Pennsylvania State University, USA, August 14 -16, pp. P1-67 - P1-72.

Invited Papers

1. Gavaises M., Strotos G., *Theodorakakos A.* and Bergeles G., “Cooling effectiveness of water droplets falling on a flat plate”, *Invited paper*, DITICE workshop on drop/wall interaction: Industrial applications, Experiments and Modelling, University of Bergamo, Italy, May 2006.
2. Gavaises M., Spathopoulou M and *Theodorakakos A.*, “A hybrid VOF – Lagrange model for the dense spray simulation”, *Invited paper*, DIPSI workshop Droplet Impact Phenomena & Spray Investigations, University of Bergamo, Italy, May 2009.

Awards

1. IMechE 2007 PE Publishing Award by the Editorial Board for publication: Tonini S., Gavaises M., Arcoumanis C., *Theodorakakos A.* and Kometani S., (2007), “Multi-component fuel evaporation and its effect on spray development air-fuel mixing in a direct injection gasoline engine”, Proceeding of IMechE, Part D, Journal of Automobile Engineering, volume 221, issue 10, pp 1321–1342.

Patent applications

1. Methods of Predicting Cavitation Damage, US Patent Office Application No 60/877,633, Filed 29th December 2006, by Stockner Alan, Ibrahim Daniel, Gavaises Manolis, *Theodorakakos Andreas.*

Career and Research highlights

Following completion of my degree as Mechanical Engineer at National Technical University of Athens, Greece (NTUA), I pursued my PhD research (1993–1998) in the Fluids Section of the department of Mechanical Engineering of NTUA. The topic of my PhD Thesis was related to the development of a fully 3-D Computational Fluid Dynamics (CFD) solver able to simulate the flow in complex geometries with moving boundaries, such as the flow in internal combustion (IC) engines. Simultaneously, two-phase flow models for droplet dynamics, spray injection, dispersion, vaporization and mixing were developed and implemented into the flow solver.

Upon completion of my PhD and after an 18-month break in my research career for the obligatory military service in the Greek Army, I participated at NTUA as the main researcher in a number of EU sponsored research programs. Various multi-phase models and related numerical methodologies have been developed and implemented in an in-house CFD code that he has co-develop over the years. These models address both fundamental physical processes, such as the behavior of droplet impact on cold and heated surfaces, and real industry problems, for example steel casting and slag removal.

From 1999 I work with a CFD consulting group. The group specializes in the development and application of specialized fluid dynamics processes. The engineering problems addressed have mainly targeted (but not limited) to the multi-phase flows realized in various automotive application. Many multinational automotive companies have sponsored the research activities of the group. These include the Ford Motor Company (Germany), Yamaha Motor Company (Japan), Toyota Motor Europe (Belgium), Delphi Diesel Systems (UK), Caterpillar Fuel Systems (USA), Caterpillar/Perkins Engines (UK), Siemens Automotive VDO (Italy), Daimler-Chrysler AG (Germany) and Woodward Diesel Systems (UK).

Since 2006 I am also teaching in Technological Institution (TEI) of Piraeus, Greece. In 12/2012, after my election, I was appointed Assistant Professor in the same Institution.

Focus of my research has mainly been placed in the area of CFD methodologies and their implementation for simulating complicated cases for either fundamental research (i.e. single droplet behavior or splashing) or cases of profound technical interest (i.e. environmental flows, flow in engines and injectors, etc). The last ten years many projects I have been involved are related with cavitation occurring in high pressure Diesel and gasoline fuel injector and fuel pumps. This topic has generally attracted a lot of industrial interest the last few years due to the profound effect it has on both the durability of the fuel nozzles and the injected spray plume. Another topic that has attracted my interest and I have been involved in projects the last few years is the simulation of flows of medical interest, mainly flow in coronary arteries with or without stenosis or stent implantations.

The CFD computer code developed, and for which I have major contribution, incorporates many advanced features such as the ability to use unstructured meshes, can utilize automatic local grid refinement, can handle two-phase flows with evaporation, can simulate particles and / or droplets, vaporization (cavitation) of liquid phase, etc.

This code has been successfully used to study most of the projects described above and has also been used by the Aerodynamics Laboratory of NTUA, City University, the University of Bergamo and the Department of Mechanical Engineering at the University of Western Macedonia Greece.