CURRICULUM VITAE

1 PERSONAL DETAILS

Full name	Tomasz Aleksander Kowalewski.
Date of Birth	25th September, 1947.
Place of Birth	Łódź, Poland.
Citizenship	Polish.
Married	17th July, 1969.
Children	Daughter born 2. Feb. 1970, son born 28. Feb. 1973.
Work Address	Institute of Fundamental Technological Research, Polish Academy of Science (IPPT PAN), Świętokrzyska 21, PL 00-049 Warszawa, Poland. Phone: +48-22-8269803, Fax: -8269815 e-mail: tkowale@ippt.gov.pl http://www.ippt.gov.pl/˜ tkowale
Home Address	Akermańska 7/13, PL 02-760 Warszawa Phone: +48-22-8425115, +48-602193472 (mobile).

2 ACADEMIC QUALIFICATIONS

Degrees	M.Sc. in Physics with Dean's Distinction Award, Warsaw University, 1969. Ph.D., Institute of Fundamental Technological Research, Polish Academy of Science (IPPT PAN), Warsaw, 1982. Habilitation, Institute of Fundamental Technological Research, Polish Academy of Science (IPPT PAN), Warsaw, 1995.

3 APPOINTMENTS

Present	Docent (Associate Professor), head of the Department of Mechanics and Physics of Fluids, Institute of Fundamental Technological Research, Polish Academy of Science (IPPT PAN), Warsaw, Poland.
June 1993 – June 1994	Wissenschaftlicher Mitarbeiter (Senior Research Associate), Max-Planck-Institut für Strömungsforschung, Göttingen, Germany

March 1988 – May 1993	Wissenschaftlicher Mitarbeiter (Senior Research Associate), Institut für Angewandte Mechanik und Strömungsphysik, Georg-August-Universität, Göttingen.
Oct. 1985 – Feb. 1988	Visiting Scholar, research fellowship by Max-Planck-Institut, Göttingen.
Sept. 1969 – June 1987	Asystent (Research Assistant) and Adiunkt (Senior Research Associate), Institute of Fundamental Technological Research, Polish Academy of Science (IPPT PAN), Department of Fluid Mechanics, Warsaw, Poland.

4 SCHOLARSHIPS

Aug. – Sept. 1978	Visiting scholar at the Delft University, Holland (by Prof. J.A. Steketee). Hot-Wire Anemometry.
Nov. – Dec. 1980	Visiting scholar at the Max-Planck-Institut für Strömungsforschung, Göttingen (by Prof. E.-A. Müller). Investigations of two-phase flow with help of Laser-Doppler-Anemometry.
Mar. – June 1982	Visiting scholar at the Stanford University (by Prof. A. Acrivos). M. Curie-Sklodowska joined Polish-American project on sedimentation and flow of suspensions.
Oct. 1985 – Feb. 1988	Scientific fellowship from the Max-Planck-Society, Institut für Strömungsforschung, Göttingen (by Prof. E.-A. Müller). Experimental modeling of fuel injection and evaporation; fuel film deposition on the walls of engine manifolds.
Feb. – Apr. 1993	Visiting Fellow at the University of New South Wales, School of Mechanical and Manufacturing Engineering. (by Prof. G. de Vahl Davis). Experimental and numerical investigation of the natural convection.
Mar. 1995 – Jan. 1996	Visiting Fellow at the Israel Institute of Technology, TECHNION, Dept. of Aerospace Engineering (by Prof. M. Wolfshtein), Haifa, Israel. Investigations of droplet combustion. Teaching (two semesters course) Advanced Methods in Aerodynamics.
April 1997	Visiting Professor at the University Paris XI (Orsay), lecturing: "Advanced experimental methods in fluid mechanics".
April-May 1998	Visiting Professor at the University "La Sapienza" and Roma Tre (Rome), application of the PIV method for combustion flow
March 1999	Visiting Professor at the University Paris XI (Orsay)
Dec 1999 - Jan 2000, Sept. - Nov. 2000, Dec. 2001 - Jan 2002	Visiting Scholar at Arizona State University
March 2002	Visiting Professor at the University Paris XI (Orsay)
March 2003	Visiting Professor at the University of New South Wales (Sydney)

5 RESEARCH EXPERIENCE

1969 – 1985	Research work at the Institute of Fundamental Technological Research (Warsaw), during the experimental study towards Ph.D. degree on low Reynolds number flow of suspensions; experimental investigations of the jet break-up, modeling of the fibre spinning.
1986 – 1987	Research work at the Max-Planck-Institut, Evaporation of fuels and retrograde fluids; atomisation of fuels; investigation of natural convection.
1988 – 1991	Research grants from Deutsche Forschungsgemeinschaft through the University Göttingen: *Experimental investigations of the instabilities of the evaporating liquid jets* (DFG 201/18) and
1991 – 1993	*Dynamic properties of the jets of liquid mixtures* (DFG201/20).
1994 – 1997	Research grant from Polish Scientific Committee (KBN): *Flow pattern selection for natural convection with phase change in a lid cooled cavity* (KBN 2P404000107)
1995 – 1996	9 months Lady Davis Fellowship, Application of PIV and image processing for diagnostics of flow with combustion, Israel Institute of Technology, TECHNION, Haifa
1996 –	Research collaboration (project conjoins) IPPT PAN – LIMSI CNRS, *L'etude numerique et experimentele de la dynamique du gossissement et du decrochement des bulles de vapeur dans le cas de l'ebullition heterogene*
Other activities	Nonlinear dynamic of the oscillating droplet; evaporation of droplets; evaporation induced surface instabilities; image processing; high-Speed video imaging; flow visualisation; tracking of tracer particles in the flow; natural convection; convection with phase changes; Particle Image Velocimetry (PIV), liquid crystals thermography (PIT), computational fluid dynamics.

6 MAIN RESEARCH TOPICS

Keywords: Fluid mechanics, multiphase flow, free surface flow, thermally driven flow, flow with phase changes. Experimental and numerical methods.

- Experimental investigations of liquid jet break-up. Evidence of "super" thin liquid bridges between liquid jet and the droplet. Instability of evaporating jets, modeling of droplet and liquid jet evaporation. Evaporation of emulsions [9, 10, 13, 31, 35, 43-45].
- Experimental and numerical investigation of nonlinear droplet oscillations. Description of droplet deformation. Development of non-intrusive method to measure dynamic surface tension, measurements of the physical parameters of evaporating surface by oscillating droplet method [11, 18, 20, 21, 25, 26, 36, 37, 40, 42].
- Development of high speed video recording methods based on CCD "frame-transfer" camera and

image processor. Application of the method for investigation of droplets and jet instabilities [8, 11, 15, 19, 32].

- Experimental and numerical investigation of natural convection, identification of new flow structures; investigation of natural convection in presence of phase change (freezing) [12, 14, 16, 24, 27, 29, 41, 46-54].
- Development of new experimental technique for instantaneous measurement of temperature and velocity two-diemnsional fields in thermal flow, based on application of liquid crystal as tracers [7, 14, 29, 34,48,49].
- Investigations of low Reynolds number two-phase flow in tubes (solid and liquid suspensions). Application of new measuring techniques for measuring velocity and particle concentration, laser doppler and ultrasound doppler anemometry [1-6].

7 EDUCATIONAL EXPERIENCE

Direct supervision of 7 M.Sc. and 3 Ph.D. students graduated at the Georg-August University Göttingen; 2 Ph.D. and 1 M.Sc. students at Warsaw University of Technology.

Graduate course: *Advanced Methods in Aerodynamics* (two semesters) given at TECHNION, Dept. of Aerospace Engineering.

Languages: English, German - good; Russian, French - weak.

8 REVIEWER

Journals

1. Journal of Fluid Mechanics
2. Physics of Fluids
3. Archives of Mechanics
4. Computer Assisted Mechanics and Engineering Sciences
5. Journal of Engineering Mathematics (memeber of Board of Assoc. Referees)
6. Journal of Heat Mass Transfer
7. Applied Thermal Engineering

Research grants, professor nomination

1. National Science Foundation, Grants Committee, Washington, USA
2. Australian Research Council, Grants Committee, Canberra, Australia
3. The University of New South Wales, Promotion to Professor, Sydney, Australia
4. Deutsche Forschungsgemeinschaft (DFG), Grants Committee, Germany.
5. Israel Science Foundation (ISF), Grants Committee, Israel.
6. State Scientific Committee (KBN), Grants Committee, Poland.

9 HONOURS

Scientific Secretary, XVIIth Symposium on Advanced Problems and Methods in Fluid Mechanics, Sobieszewo (Poland), Sept.1985.

Scientific Secretary, Publication Subcommittee, IUTAM Symposium on Adiabatic Waves in Liquid-Vapour Systems, Göttingen (Germany), Aug. 1989.

Invited paper at 2nd European Fluid Mechanics Conference, Warsaw, September 1994

Invited paper at Euromech Colloquium 355 on Interfacial Instabilities, Paris, September 1996,

The Polish Academy of Sciences Award (*Nagroda Wydzialu IV PAN*) for research on jets and droplets, December 1996.

International Symposium on Advances in Computational Heat Transfer CHT97, Cesme 1997, memeber of the Scientific Committee and the expository review lecture.

European Science Foundation project on Applied Mathematics for Industrial Flow Problems, Polish memeber of the Steering Committee, memeber of the Scientific Committee, "International AMIF conferences", 1998, 2000, 2002,

Association of Image Processing, Poland (TPO), member of the Governing Board.

International Conference on Computational Heat and Mass Transfer, Cyprus, April 1999, memeber of the Scientific Committee.

Invited paper at FLUVISU 99, 8me colloque nationale de visualisation et de traitment d'images en mecanique des fluides, Toulose, June 1999.

Chairman of the Euromech Colloquium 406 "Image processing methods in applied mechanics", Warsaw, May 1999.

Chairman of the European Science Foundation AMIF Workshop PCC99 "Phase Change with Convection", Warsaw, June 1999.

Memeber of the International Board "9th and 10th Int. Flow Visualization Symposium", 2000, 2002,

Memeber of the Scientific Committee, "International Symposium on Advances in Computational Heat Transfer CHT01", Australia 2001.

Memeber of the Scientific Committee and invited paper at "International Symposium on Imaging and Visualization in Transport Phenomena VIM-01", Antalya, 2002.

President of Poland Silver Cross Award for scienitifc achievements, 2002

Secretary General, "International Congress of Theoretical and Applied Mechanics", Warsaw, 2004.

10 PRESENTATIONS AT INTERNATIONAL CONFERENCES

September 1977	XIII Biennale on Adv. Fluid Mechanics	Kortowo, Poland
September 1980	Flow Visualization II	Bochum, Germany
September 1981	XV Biennale on Adv. Fluid Mechanics	Jahranka, Poland
August 1984	16. IUTAM Congress	Lyngby, Denmark
April 1985	Euromech Colloquium	Cambridge, UK
April 1986	Taylor's 100 Birth. Aniv. Symp.	Cambridge, UK
August 1986	Flow Visualization IV	Paris, France
November 1987	ICALEO	San Diego, USA
April 1988	GAMM	Wien, Austria
August 1988	17. IUTAM Congress	Grenoble, France
August 1989	IUTAM Symposium on Topol. Fluid. Mech.	Cambridge, UK
September 1989	XIX Biennial on Adv. Fluid Mechanics	Kozubnik, Poland
December 1989	10 Aust. Fluid Mech. Conf.	Melbourne, Australia
August 1991	1. Euromech Fluid Mech. Conf.	Cambridge, UK
December 1991	11. ABCM Mech. Eng. Conf.	San Paulo, Brazil
August 1992	18. IUTAM Congress	Haifa, Izrael
October 1992	Flow Visualization VI	Yokohama, Japan
October 1993	1. Japan-Polish Joint Seminar	Tokyo, Japan
June 1994	2. Japan-Polish Joint Seminar	Pułtusk, Poland
August 1994	10th Int. Heat Transfer Conference	Brighton, UK
September 1994	2. Euromech Fluid Mech. Conf.	Warszawa, Poland
September 1994	Jap.-Centr. Europe Workshop	Pułtusk, Poland
June 1995	Euromech Colloquium 335	Rome, Italy
July 1995	3 ICIAM Congress	Hamburg, Germany
August 1996	19. IUTAM Congress	Kyoto, Japan
September 1996	Euromech Colloquium 355	Paris, France
December 1996	Heat'96	Kielce, Poland
May 1997	Advances in Computational Heat Transfer	Cesme, Turkey
September 1997	3. Euromech Fluid Mech. Conf.	Göttingen , Germany
June 1998	Advanced Computational Methods in Heat Transfer	Cracow , Poland
September 1998	8th Flow Visualization	Sorrento, Italy
October 1998	AMIF - ESF Conference	San Feliu, Spain
May 1999	Euromech 406 Colloquium	Warszawa, Poland
June 1999	FLUVISU 99	Toulouse, France
June 1999	PCC99 AMIF-ESF Workshop	Warszawa, Poland
August 1999	Cold-Region Thermal Eng. ISTESCR'99	Darmstadt, Germany
September 1999	Laser Anemometry Adv. EALA'99	Rome, Italy
August 2000	9th Flow Visualization	Edinburg, Scotland
August 2000	20. IUTAM Congress	Chicago, USA
June 2001	CMEM 2001	Alicante, Spain
December 2001	3d ISEH	Tempe (AZ), USA
May 2002	VIM'01	Belek, Turkey
June 2002	HEAT2002	Baranow, Poland
August 2002	12 Heat Transfer Conf.	Grenoble, France
October 2002	Eurotherm 71	Reims, France

11 PUBLICATIONS

1. *Velocity profiles of suspension flowing through a tube*, Arch. Mech., **32**, pp. 857-865, 1980.

2. *Laser Doppler measurements of the velocity profiles of concentrated droplet suspensions flowing through a tube*, Bericht 118/1980, Max-Planck-Institut für Strömungsforschung, Göttingen 1980.

3. *Experimental investigation of laminar flow of suspension in channels* (in Polish), Ph.D. dissertation, IPPT PAN, Warsaw 1982.

4. *Laser method of particles distribution measurements in the flow of suspensions*, in: Flow Visualization II, Bochum 1980, Ed. W. Merzkirch, Hemisphere 1982, pp. 541-546.

5. *Concentration and velocity measurements in the flow of droplet suspensions*, Exp. in Fluids, **2**, pp. 213-219, 1984.

6. *An experimental study of the lateral migration of a droplet in a creeping flow*, with W. Hiller, Exp.in Fluids, **5**, pp. 43-48, 1987.

7. *Simultaneous measurement of temperature and velocity fields in thermal convective flows*, with W. Hiller, in: Flow Visualization IV, Paris 1986, Ed. Claude Veret, Hemisphere 1987, pp. 617-622.

8. *Eine einfache Hochgeschwindigkeitskamera mit CCD- Sensor*, with W. Hiller, Bericht 8/1987, Max-Planck- Institut für Strömungsforschung, Göttingen 1987.

9. *Freistrahlversuche zum genauen Einsatz der Verdampfungseffekte bei Einspritzung von verschiedenen motorischen Kraftstoffen*, with H. Chaves, H.-D. Speckmann and G.E.A. Meier, Bericht 102/1987, Max-Planck-Institut für Strömungsforschung, Göttingen 1987.

10. *Untersuchung des Verdampfungsverhaltens von Einspritzstrahlen in einem Saugrohrmodell*, with H. Chaves and G.E.A. Meier, Bericht 103/1987, Max-Planck-Institut für Strömungsforschung, Göttingen 1987.

11. *An optical method for surface tension measurements of dispersed liquid droplets*, with W.J. Hiller, in: Proc. of ICALEO'87, 6th Int. Congress on Application of Laser and Electro-Optics, Optical Methods in Flow and Particle Diagnostics, vol. 63. Ed. W. Stevenson, Publ. Laser Institut of America, pp. 106-110, Toledo 1988.

12. *Three-dimensional structures in laminar natural convection in a cubic enclosure*, with W.J. Hiller, St. Koch, Proc. of 1st. Word Conference on Exp. Heat Transfer, Fluid Mech., and Thermodyn., Dubrovnik 1988, ed. R.K. Shah et al., Elsevier Scis. Publ., New York, Amsterdam, London, pp. 722-729, 1988.

13. *Similarity in the behaviour of initially saturated or subcooled liquid jets discharging through a nozzle*, with H. Chaves, Th. Kurschat, G.E.A. Meier, E.A. Müller, Chem. Phys. **126**, pp. 137-143, 1988.

14. *Simultane Erfassung von Temperatur- und Geschwindigkeitsfeldern in einer thermischen Konvektionsströmung mit ungekapselten Flüssigkristalltracern*, with W.J. Hiller, St. Koch, in: 2D-Messtechnik DGLR-Workshop 18-19. Oct. 1988, Markdorf, DGLR-Bericht 88-04, pp. 31 - 39, Bonn 1988.

15. *Application of the frame transfer charge-coupled device for high speed imaging*, with W.J. Hiller, Optical Eng. **28** pp. 197-200, 1989; also in: Proc. 18th Int. Congr. of High Speed Photography and Photonics, 28. Aug.-2. Sept. 1988 Xian China, SPIE Vol. 1032, pp. 763 - 765, Washington 1990.

16. *Three-dimensional structures in laminar natural convection in a cubic enclosure*, with W.J. Hiller, St. Koch, Exp. Thermal and Fluid Sci., **2**, pp. 34-44, 1989.

17. *Surface tension measurements by the oscillating droplet method*, with W.J. Hiller, Physico-Chem. Hydrodynam., **11**, pp. 103-112, 1989.

18. *Optical investigation of oscillating liquid droplets*, with W.J. Hiller, ZAMM **69**(6), pp. 629-630, 1989.

19. *Schnelle Bildaufzeichnung mit CCD-Kameras und gepulsten LEDs - High Speed Image Recording*, with W.J. Hiller, B. Stasicki, Laser und Optoelektronic **21**, pp. 64-67, 1989.

20. *Experimental analysis of free oscillating liquid drops*, with W.J. Hiller, in: Proceedings of the 10th Australasian Fluid Mechanics Conference, University of Melbourne, Dec. 1989, pp. 7.21 -7.24, 1989.

21. *Liquid microjets - a useful tool for the measurement of material properties*, with W.J. Hiller, in: Proc. of the 10th ABCM Mechanical Engineering Conf., Rio de Janeiro (Brasil), Dec. 1989, Eds. M. Hirata et al., pp. 423 - 426, COPPE/UFRJ 1989.

22. *Vergleichende Grunlagenstudie über das Schwingungsverhalten osczillierender Wurzelkanalinstrumente*, with Griesinger H.R., W.J. Hiller, Kreter F., Zahnärztliche Praxis 5, pp. 168-173, 1989.

23. *Vibrationsinduzierte Strömungsfelder und Kavitationseffekte dreier Systeme zur Wurzelkanalaufbereitung im Modellversuch*, with Griesinger H.R., W.J. Hiller, Kreter F., Zahnärztliche Praxis 6, pp. 213-217, 1989.

24. *Experimental and Numerical investigation of natural convection in a cube with two heated side walls*, with W.J. Hiller, St. Koch, G. de Vahl Davis, M. Behnia, in: Proc. of IUTAM symposium on topological fluid mechanics, Cambridge U.K., Aug. 13-18, 1989, pp. 717 - 726, CUP 1990.

25. *Experimental and theoretical investigations of large amplitude oscillations of liquid droplets*, with E. Becker, W.J. Hiller, J. Fluid Mech. **231**, pp. 189-210, 1991

26. *Unsteady droplet evaporation* with W.J. Hiller, in: Proc. of 11th ABCM Mech. Eng. Conf. São Paulo (Brasil), Dec. 1991, Ed. Esp. da Revista Brasileira de Ciências Mecânicas São Paulo, pp. 17-20, 1991.

27. *Visualization of 3-D natural convection - comparison with numerical results*, with W.J. Hiller, St. Koch, K. Range, M. Behnia, G. de Vahl Davis, in: Proc. of 11th ABCM Mech. Eng. Conf. São Paulo (Brasil), Dec. 1991, Ed. Esp. da Revista Brasileira de Ciências Mecânicas São Paulo, pp. 21-24, 1991.

28. *Computer-aided discrimination of slow and fast tracer paths*, with H.-H. Bartels-Lehnhoff, W.J. Hiller, Exp. in Fluids, **13**, pp. 239-248, 1992; also in: Proceedings of The Sixth International Symposium on Flow Visualisation, Yokohama 1992, Eds. Tanida Y. & Miyashiro H., Springer-Verlag, pp. 873–877, 1992.

29. *Visualisation of 3-D natural convection*, with W.J. Hiller, St. Koch, P. Mitgau, K. Range, *Proceedings of The Sixth International Symposium on Flow Visualisation, Yokohama 1992* Eds. Tanida Y. & Miyashiro H., Springer-Verlag, pp. 674–678, 1992.

30. *Charge-coupled devices in flow visualisation*, with W.J. Hiller, V. Llorach Forner, B. Stückrad, M. Behnia, in: Proceedings of The Sixth International Symposium on Flow Visualisation, Yokohama 1992, Eds. Tanida Y. & Miyashiro H., Springer-Verlag, pp. 695–699, 1992.

31. *Behaviour of small diameter evaporating jets*, with W.J. Hiller, Behnia M.,, in: Proceedings of the 11th Australasian Fluid Mechanics Conference, University of Tasmania, Hobart, Australia, 14-18. Dec. 1992, pp. 905–908, U.T. 1992.

32. *High speed frame transfer CCD*, with W.J. Hiller, Tatarczyk Th., in: *Proc. 20th Int. Congr. of High Speed Photography and Photonics, 21-25. Sept. 1992 Victoria, Canada*, SPIE Vol. 1801, pp. 595–601, Washington 1993.

33. *Wake patterns of a piston gliding in a rotating circular duct*, with W.J. Hiller, in: Bluff-Body Wakes, Dynamics and Instabilities, IUTAM Symposium, Göttingen, Germany, Sept. 7-11, 1992, Eds. H. Eckelmann et al., Springer-Verlag, pp. 165–169, 1993.

34. *Onset of natural convection in a cube*, with W.J. Hiller, St. Koch, F. Stella, Int. J. Heat Mass Transfer, **13**, pp. 3251–3263, 1993.

35. *An experimental study of evaporating small diameter jets*, with W.J. Hiller, M. Behnia, Physics of Fluids A **5**, pp. 1883–1890, 1993.

36. *Measurement of dynamic surface tension by the oscillating droplet method*, with B. Stückrad, W.J. Hiller, Exp. in Fluids, **15**, pp. 332-340, 1993.

37. *Nonlinear dynamics of viscous droplets*, with E. Becker, W.J. Hiller, J. Fluid Mech., **258**, pp. 191-216, 1994.

38. *Computational and experimental visualisation in heat and mass transfer problems*, with W.J. Hiller and G. de Vahl Davis, in Proc. of the First Japanese-Polish Joint Seminar in Advanced Computer Simulation, Tokyo, Nov. 8-9, 1993, pp. 60–69, Edts. Akiyama, Kleiber, Wolański, University of Tokyo Feb. 1994.

39. *Verfolgung von Teilchen in einer dreidimensionalen Strömung*, with P.M. Mitgau, W.J. Hiller, ZAMM **74**(5), pp. T394–396, 1994.

40. *Reduction of nonlinear dynamic systems by phase space analysis*, with E. Becker, U. Brosa, Computer Assisted Mechanics and Eng. Sci., **1**, pp. 39-48, 1994.

41. *Experimental and numerical study of three-dimensional natural convection and freezing in water*, with C. Abegg, G. de Vahl Davis, W.J. Hiller, St. Koch, E. Leonardi, G.H. Yeoh, Proc. of 10th International Heat Transfer Conference, Brighton, England, Edt. G.F. Hewitt, vol.4, pp. 1-6, IChemE 1994.

42. *Nonlinear Oscillations of Viscous Droplets*, with D. Bruhn, Proc. of Japanese-Centr. European Workshop on Adv. Comp. in Eng., Pułtusk 1994, pp. 63-68, Edts. Akiyama, Kleiber, IPPT PAN Warszawa 1994.

43. *Experimental research on briquette destruction caused by refraction waves*, with M. Gawor, J. Rysz, A. Smolarski, Archives of Mining Scs., vol. 39, pp. 313-330, 1994.

44. *Selected free surface flow problems - liquid jets and drops*, (in Polish) Habilitation, Prace IPPT PAN 3/1995, pp.1-98, Warszawa 1995.

45. *Experimental investigations of oscillating liquid droplet*, with D. Bruhn, W.J. Hiller, F. Obermeier, ZAMM vol. 76/5, pp.77-78, 1996.

46. *On the separation of droplets from a liquid jet*, Fluid Dynamics Research **17**, pp. 121-145, 1996.

47. *Distribution of particles suspended in 3-d laminar convection flow*, with A. Yarin, W.J. Hiller, St. Koch, Physics of Fluids **8**, pp. 1130-1140, 1996.

48. *Experimental and numerical investigations of natural convection in freezing water*, with A. Cybulski, in Int. Conf. on Heat Transfer with Change of Phase, Mechanics vol. 61 p.II, pp. 7-16, Kielce 1996.

49. *Experimental validation of numerical codes in thermally driven flows*, Prace IPPT PAN 4/1997, pp.1-20, Warszawa 1997.

50. *Natural convection with phase change* (in Polish), with A. Cybulski, Prace IPPT PAN 8/1997, pp.1-58, Warszawa 1997.

51. *Estimation of acoustic streaming: theoretical model, Doppler measurements and optical visualisation*, with A. Nowicki, W. Secomski, J. Wojcik, European J. of Ultrasound **7**, pp. 73-81, 1998.

52. *Experimental validation of numerical codes in thermally driven flows*, in Adv. in Computational Heat Transfer, G. de Vahl Davis, E. Leonardi (eds), Begel House Inc., pp.1-15, New York 1998.

53. *An experimental benchmark for freezing water in the cubic cavity* with M. Rebow, in Adv. in Computational Heat Transfer, G. de Vahl Davis, E. Leonardi (eds), Begel House Inc., pp.149-156, New York 1998.

54. *Fixed grid finite elemnt analysis of solidification* with J. Banaszek, M. Rebow, in Adv. in Computational Heat Transfer, G. de Vahl Davis, E. Leonardi (eds), Begel House Inc., pp.471-478, New York 1998.

55. *Free surface natural convection in a differentially heated rectangular cavity,* with G. de Vahl Davis, E. Leonardi, in Advanced Computational Methods in Heat Transfer V, A.J. Nowak, C.A. Brebbia, R. Bialecki, M. Zerroukat (eds.), pp. 145-154, CMP 1998.

56. *Particle Image Velocimetry with Optical Flow*, with G. M. Quénot, J. Pakleza, Experiments in Fluids **25**, pp.177-189, 1998.

57. *Analysis of validation of the semi-implicit FEM algorithm for natural convection and freezing water,* with J. Banszek, M. Rebow, K. Blogowska, in Computational Technologies for Fluid/Thermal/Structural/Chemical Systems with Industrial Applications, V.V. Kudriavtsev, W. Cheng (eds), ASME PVP-Vol.377-1, pp.119-126, 1998.

58. *Fluid Image Velocimetry for Unseeded flow,* with Y. Levy, B. Golovanevsky in Proc. of 9th Int. Symp. on Application of Laser Technique in Fluid Mech., July 13-16, Lisbon, vol. II, pp. 34.7.1-34.7.9, 1998.

59. *Characterisation of the interaction between a boundary layer and a cavity using Digital Particle Velocimetry with Optical Flow,* with G. Quenot, A. Rambert, P. Gougat, in Proc. of 9th Int. Symp. on Application of Laser Technique in Fluid Mech., July 13-16, Lisbon, vol. II, pp.39.4.1-39.4.7, 1998.

60. *Study of free convection in binary systems with phase change,* with J. Banaszek, M. Rebow, P. Furmanski, T. Wisniewski, in Heat Transfer 1998, Kyongju, Korea, edt. J.S. Lee, vol.7, pp. 211-216, Taylor and Francis Inc., 1998.

61. *Particle Image Velocimetry and Thermometry in Freezing Water,* with A. Cybulski, M. Rebow, in 8th Int. Symposium on Flow Visualization, Sorrento, eds. G.M. Carlomagno and I. Grant, CD ROM Proceedings ISBN 0953399109 , pp. 24.1-24.8, Edinburgh, 1998.

62. *Particle Image Velocimetry using Optical Flow for Image Analysis,* with G. Quenote, J. Pakleza, in 8th Int. Symposium on Flow Visualization, Sorrento, eds. G.M. Carlomagno and I. Grant, CD ROM Proceedings ISBN 0953399109, pp. 47.1-47.11, Edinburgh, 1998.

63. *Infrared and Liquid Crystal Thermography in Natural Convection,* with T. Wisniewski, M. Rebow, K. Blogowska, in 8th Int. Symposium on Flow Visualization, Sorrento, eds. G.M. Carlomagno and I. Grant, CD ROM Proceedings ISBN 0953399109, pp. 212.1-212.8, Edinburgh, 1998.

64. *Thermochromic liquid crystals in heat transfer research*, with J. Stasiek, invited paper at Heat Mass Transfer Conference, Swieradow, Sept. 1998, Prace Polit. Wroclaw. 53/9, vol. 1, pp. 401-424, Wroclaw 1998.

65. *Freezing of water in the differentially heated cubic cavity*, with M. Rebow, Int. J. of Comp. Fluid Dyn. vol. 11, pp. 193-210, 1999.

66. *Particle Image Velocimetry and Thermometry in Freezing Water*, with A. Cybulski, frontispiece (colour page) in J. of Visualization, vol. 1, p. 335 , 1999.

67. *Effect of finite wall conductivity on flow structures in natural convection*, with E. Leonardi, V. Timchenko, G. de Vahl Davis, paper at CHMT99, Proceedings of the International Conference on Computational Heat and Mass Transfer, Cyprus 26-29 April, 1999, eds. A.A. Mohamad & I. Sezai, pp. 182-188, Eastern Mediterranean University Printinghouse 1999.

68. *Particle Image Velocimetry and Thermometry Using Liquid Crystals*, invited paper at FLUVISU 99, 8me colloque nationale de visualisation et de traitment d'images en mecanique des fluides, Toulose, June 1-4, 1999, ENSICA, pp. 33-48, Image Service 1999.

69. *Measurement of Temperature and Velocity of Freezing Water using Liquid Crystal Tracers* in Advances in Cold-Region Thermal Engineering and Sciences, eds. K. Hutter, Y. Wang and H. Beer, Lecture Notes in Physics vol. 533, pp. 83-90, Springer Verlag, Berlin 1999.

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