February 2021

Alexander Yu. Gelfgat

CURRICULUM VITAE

PERSONAL:

Name	Alexander Yuri Gelfgat
Date and Place of Birth:	13 August 1961, Riga, Latvia
I.D. number	311710602
Date of Immigration:	6 October 1993
Citizenship	Israeli
Marital Status:	Married, 2 children
Present Address	17 Hayarkon str., Kefar Yona, Israel, 40300
Telephone	972-3-6407207 (office), 972-77-4241373 (home), 972-54-4749702 (cell)
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ACADEMIC DEGREES:

1983: M.Sc., Faculty of Physics and Mathematics, Latvian State University.
Thesis: "Investigation of buoyancy and thermocapillary convection in a cavity with different temperature on the horizontal and vertical walls".
Supervisor: B. Martuzans

1989 : Ph.D. (Cand. Sci.), Leningrad Polytechnic Institute,
(at present: S.Petersburg Technical University).
Thesis "Instability and oscillatory supercritical regimes of free convection in a laterally heated square cavity".
Supervisors: B. Martuzans, G. Gershuni

PROFESSIONAL EXPERIENCE

1980 - 1981	Assistant, Faculty of Physics and Mathematics, University of Latvia
1982 -1983	Assistant, Computer Center, University of Latvia
1984 -1986	Ph.D. student, University of Latvia
1987 - 1989	Research Fellow, Department of Mathematical Physics, Computer Center (recently Institute of Mathematics and Computer Science), University of Latvia
1990 - 1991	Leading Research Associate, Department of Mathematical Physics, Institute of Mathematics and Computer Science, University of Latvia

January – August 1992	Senior Researcher, Department of Mathematical Physics, Institute of Mathematics and Computer Science, University of Latvia
August 1992 - August 1993	Post-doctoral Fellow, Institute of Industrial Science, University of Tokyo.
March 1994 – March 2000	Research Associate, Faculty of Mechanical Engineering, Technion
June 1999	Visiting Fellow, Institute of Fundamental Technological Research, Polish Academy of Sciences
April 2000 – September 2002	Senior Research Associate, Mechanical Engineering, Technion, Haifa, Israel (in the framework of KAMEA program)
August 2000	Visiting fellow, LIMSI CNRS, France
October 2001	Visiting Fellow, Toyo University, Japan
July 2002	Visiting Fellow, Polytechnic University of Catalunya, Spain
October 2002 – April 2006	Senior Lecturer, Department of Fluid Dynamics and Heat Transfer, Faculty of Engineering, Tel-Aviv University.
April 2006 – August 2011	Associate Professor with tenure, School of Mechanical Engineering, Faculty of Engineering, Tel-Aviv University.
August 2009 – July 2010	Senior Marie Curie Fellow, School of Mechanical Materials & Manufacturing Engineering and School of Mathematical Sciences, University of Nottingham, UK. Sabbatical leave supported by Marie Curie Mobility Grant
Since September 2011	Full Professor with tenure, School of Mechanical Engineering, Faculty of Engineering, Tel-Aviv University.

RESEARCH INTERESTS:

- Thermal, mechanical and electromagnetic control of stability of flows driven by convection and rotation in crystal growth processes and devices.
- Electrohydrodynamic control of thermocapillary drift of drops and bubbles.
- Numerical tracking of moving phase-change fronts and capillary boundaries.
- Heat and mass transfer enhancement by vortical flows induced by hydrodynamic instabilities.
- Modeling of three-dimensional instabilities of convective and rotating flows.
- Flows in helical pipes
- MHD applications in materials processing.
- Generalized stability theory, non-modal perturbation growth, bypass transition.
- Direct Numerical Simulation (DNS) of 3D flows.
- Spatially developing instabilities in shear flows.
- Spectral methods for numerical fluid dynamics and heat/mass transfer.
- Finite volume method in computational fluid dynamics and heat/mass transfer.

- Pressure-velocity coupled CFD
- Experimental studies on flow instabilities.
- Numerical application of stability analysis in computational fluid dynamics and heat transfer.
- Parallelization of CFD codes on parallel computers
- Benchmarking and experimental validation of numerical codes**.**

TEACHING EXPERIENCE

- Technological University of Latvia, Dept. of Computer Science. "*Programming and Numerical Methods*". 1991-1992. Lecturer
- Technion - Israel Institute of Technology, Faculty of Mathematics. "*Fourier series and integral transforms* ". Winter semester, 1997-1998. Lecturer.
- Technion - Israel Institute of Technology, Faculty of Mechanical Engineering. "*Numerical Analysis* ". Spring semester, 1998. Lecturer.
- Technion - Israel Institute of Technology, Faculty of Mechanical Engineering. "*Finite element methods in engineering* ". Winter semester, 1998-1999. Lecturer.
- Haifa University, Department of Mathematics. “Partial Differential Equations and Applications”, Winter semester 2000-2001, 2001-2002, 2002-2003, Lecturer.
- Haifa University, Department of Mathematics. “Parallel Computing”, Spring semester 2001, 2002, Lecturer.
- Tel Aviv University, Department of Fluid Mechanics and Heat Transfer. “Heat Transfer”, Winter semester 2003-2009, 2011-2014, 2018, 2020, Lecturer.
- Tel Aviv University, Department of Fluid Mechanics and Heat Transfer. “Convection Heat Transfer”, Spring semester 2003, 2005, Lecturer.
- Tel Aviv University, Department of Fluid Mechanics and Heat Transfer. “Mechanics of particles”, Winter semester 2003-2004, Lecturer.
- Tel Aviv University, Department of Fluid Mechanics and Heat Transfer. “Laboratory for thermal packaging”, Spring semester 2004-2009, Lecturer.
- Tel Aviv University, School of Mechanical Engineering, Faculty of Engineering. “Fluid Mechanics - 1”, Spring semester 2006, 2007-2009, 2011, 2011-2019, Lecturer.
- Tel Aviv University, School of Mechanical Engineering, Faculty of Engineering. “Advanced Fluid Mechanics,” Spring semester 2011 – 2013, 2015, 2018, 2021, Lecturer.
- Tel Aviv University, School of Mechanical Engineering, Faculty of Engineering. "Mathematical Methods for Mechanical Engineers", Winter semester, 2013-2015.
- Tel Aviv University, School of Mechanical Engineering, Faculty of Engineering. "Hydrodynamic stability", Winter semester, 2021.

PUBLIC PROFESSIONAL ACTIVITIES:

Reviewer for journals:

Journal of Fluid Mechanics; Physics of Fluids; Physical Review Fluids; Proceedings of Royal Society, Series A; European Journal of Mechanics, B/Fluids; Journal of Fluids Engineering; Journal of Crystal Growth;Journal of Computational Physics;Physica D (Nonlinear phenomena); Fluid Dynamic Research;Experiments in Fluids; Acta Mechanica;Theoretical and Computational Fluid Dynamics; International Journal for Numerical Methods in Fluids; International Journal of Heat and Fluid Flow; International Journal of Heat and Mass Transfer; Magnetohydrodynamics; Numerical Heat Transfer; Computers and Fluids; Computers and Structures; Crystal Research and Design; Microgravity Science and Technology; International Journal of Thermal Sciences; Journal of Oceans Engineering; Chemical Engineering Science; Environmental Fluid Mechanics; Langmuir; Europhysics Letters; Canadian Journal of Physics; Computational Fluid Dynamics Journal; Computational Thermal Sciences; Computer Modeling in Engineering & Sciences; Archives of Mechanics; Review of Scientific Instruments; Proceedings of Royal Society of Edinburg A; Transport in Porous Media; Journal of Engineering Mathematics; Journal of Solar Energy Engineering; Journal of Aerospace Computing, Information, and Communication; International Journal of Turbo & Jet Engines; Journal of Enhanced Heat Transfer; The Open Mechanical Engineering Journal; International Journal of Physical Sciences; Acta Physica Polonica A; Journal of Zhejiang University – Science A (*published by Springer*); International Scholarly Research Notices: Mechanical Engineering; Crystals; Mathematics (MDPI)

Reviewer for conferences:

2nd International Symposium on Two-Phase Flow Modeling and Experimentation. Pisa, Italy, May 23-25, 1999.
8th International Symposium on Computational Fluid Dynamics. Bremen, Germany, September 5-10, 1999.
14th International Crystal Growth Conference, Grenoble, France, August 9-13, 2004.
13th International Heat Transfer Conference, Sydney, Australia, August 13-18, 2006.
7th PAMIR International Conference on Fundamental and Applied MHD, Presqu´île de Giens - France, September 8 - 12, 2008.
3rd International Symposium "Bifurcations and Instabilities in Fluid Dynamics", Nottingham, UK, August 10-13, 2009.
4th International Symposium "Bifurcations and Instabilities in Fluid Dynamics", Barcelona, Spain, July 18-21, 2011.
6th Conference of the International Marangoni Association “Interfacial Phenomena in Fluid Mechanics”. Technion, Haifa, Israel, June 18-21, 2012.
9th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, Malta, July 16-18, 2012.
5th International Symposium "Bifurcations and Instabilities in Fluid Dynamics. Technion, Haifa, Israel, July 8-11, 2013.
9th World Congress on Heat Transfer, Fluid Mechanics and Thermodynamics, Lisbon, Portugal, 16-20 June, 2013.
15th International Heat Transfer Conference, Kyoto, Japan, August 10-15, 2014.
7th IMA Conference, Vienna, Austria, June 23-26, 2014

10th World Congress on Heat Transfer, Fluid Mechanics and Thermodynamics, Orlando, Florida, USA, 14-16 July, 2014.
21st Fluid Mechanics Conference, Krakow, Poland, June 15-18, 2014.
International Conference on Computing in Mechanical Engineering (ICCME'15), Kerala, India, August 10-13, 2015.
6th International Symposium "Bifurcations and Instabilities in Fluid Dynamics. PMMH, Paris, France, July 14-17, 2015.
7th International Symposium "Bifurcations and Instabilities in Fluid Dynamics. Sam Houston University, TX, USA, July 11-14, 2017.
2nd International Conference on Computer Science and Application Engineering (CSAE 2018). Hohhot, China, October 22-24, 2018.
8th International Symposium "Bifurcations and Instabilities in Fluid Dynamics. Limerick, Ireland, July 16-19, 2019.
14th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, Wicklow, Ireland, July 22-24, 2019
12th International Conference on Computational Heat, Mass and Momentum Transfer, Rome, Italy, September 3-6, 2019.
25th International Congress of Theoretical and Applied Mechanics, Milano, Italy, 2020, postponed due to COVID-19

Reviewer for research proposals:

2004, 2006 – Israel Science Foundation
2006 – German – Israeli Foundation
2006 – Ministry of Science and Technology, Israel; Infrastructures grants program
2007 – Czech Science Foundation
2008 – Ministry of Science and Technology, Israel; Israel-Croatia cooperation program
2009, 2010 – Applied Fund for Research, Hebrew University of Jerusalem
2009 – Foundation for Polish Science, Poland
2013 – Pazi IAEC-UPBC Foundation, Israel
2014 – GIF Young Scientists Program
2015 – 2017 – LinkSCEEM Mediterranean HPC Center
2017 – PAZY foundation
2018 – Ministry of Science and Technology, Israel; Israel-Italy cooperation program
2018-2021 – Israel Science Foundation, member of fluid dynamics and heat transfer committee

MEMBERSHIP IN PROFESSIONAL SOCIETIES

EUROMECH	- European Mechanics Society
IACM	- International Association for Computational Mechanics
IACMM	- Israel Association for Computational Methods in Mechanics
IACG	- Israel Association for Crystal Growth
IVC	- Israel Vacuum Society

MEMBER OF EDITORIAL BOARD OR EDITORIAL ADVISORY BOARD:

2005 to 2007 - Computational Fluid Dynamics Journal
2005 to date - Fluid Dynamics and Material Processing

2007 - Journal of Physics: Conference Series, vol. 64. Proceedings of the Second International Symposium on Bifurcations and Instabilities in Fluid Dynamics.

2010 - Journal of Physics: Conference Series, vol. 216. Proceedings of the Third International Symposium on Bifurcations and Instabilities in Fluid Dynamics.

2014 - Fluid Dynamics Research. Special issue. Selected papers from 5th International Symposium on Bifurcations and Instabilities in Fluid Dynamics. Guest Editor.

2016 - Fluid Dynamics Research. Special issue. Selected papers from 6th International Symposium on Bifurcations and Instabilities in Fluid Dynamics. Chief Guest Editor.

2018 - Fluid Dynamics Research. Special issue. Selected papers from 7h International Symposium on Bifurcations and Instabilities in Fluid Dynamics. Chief Guest Editor.

HONORARY EDITOR:

2007 to date - Computational Fluid Dynamics Journal

AWARDS :

1992 – JSPS (Japan Society for Promotion of Science) Post-Doctoral Fellowship for 1 year research in Heat Transfer Laboratory (Head - Prof. I.Tanasawa) of Institute of Industrial Science, University of Tokyo.

1998 – Best poster presentation award, 11th International Heat Transfer Conference (IHTC), August 23-28, 1998, Kyongju, Korea

1999 – European Science Foundation Visiting Grant (for a visit to Institute of Fundamental Technological Research, Polish Academy of Sciences).

1999 – National Science Foundation (U.S.A.) Participant Support Award (for participation in the Conference "Interfaces for the Twenty-First Century").

2000 – Standard Performance Evaluation Corporation (SPEC) award for the benchmark computer code (the code GALGEL included in SPEC CPU2000 distribution).

2000 – French Academy of Sciences visiting grant for the project "Dévelopement d'une méthodologie de type contrôle optimal pour la maîtrise des écoulements thermo convectifs en espaces confinés: application á la croissance cristalline" (visit to LIMSI CNRS).

2001 – Japan Society for Promotion of Science and Israeli Ministry of Science, Culture and Sport. Visiting grant for the project "Numerical modeling of stability control in bulk crystal growth" (visit to Toyo University, Japan)

2002 – Israeli Ministry of Science, Culture and Sport. Visiting grant for the project "Numerical modeling of three-dimensional nonlinear dynamics of confined swirling flows" (visit to Universidad Politécnica de Cataluña, Departamento de Física Aplicada, Barcelona, Spain).

2003 – Haifa University. Excellent lecturer award.

2005 – Israel Academy of Science and Latvian Academy of Science. Visiting grant to Institute of Physics, University of Latvia

2010 – Certificate of Valued Reviewer from Journal of Crystal Growth

2017– Certificate of Valued Reviewer from Journal of Thermal Sciences

INVITED LECTURES

Gelfgat A.Yu. "Two- and Three-dimensional Instabilities of Confined Flows: Numerical Study by a Global Galerkin Method", 8th International Symposium on Computational Fluid Dynamics, Bremen, Germany, September 5-10, 1999 (plenary lecture).

Gelfgat A.Yu. and Bar-Yoseph P.Z. “Multiple Solutions and Stability of Confined Convective and Swirling Flows”, Fifth World Congress on Computational Mechanics, Vienna, Austria, July 7-12, 2002 (keynote lecture).

Gelfgat A.Yu. "Stability analysis of fluids flows", 14th Symp. of Israel Association for Computational Methods in Mechanics, (tutorial lecture). Haifa, Israel, October 2003.

Bar-Yoseph P.Z., Gelfgat A.Yu. "Bifurcation and stability analysis for crystal growth processes", 29th Israel Mechanical Engineering Conference, Technion, Haifa, May 2003 (keynote lecture).

Bar-Yoseph P.Z., Gelfgat A.Yu. "Stability and bifurcation analysis for crystal growth processes", International Conference on Computational and Experimental Engineering and Sciences, Madeira, Portugal, 26-29 July, 2004 (keynote lecture).

Gelfgat A.Yu. "On some essential problems in numerical modeling of melt flow in bulk crystal growth", 23rd IVS Annual Conference and Technical Workshop. Tel Aviv, September 27, 2004 (keynote lecture).

Gelfgat A.Yu. “Numerical Modeling of Instabilities of Confined Flows: From Highest-Order to Lowest-Order Numerical Methods”, Workshop “Conceptual aspects of hydrodynamic stability”, Wienna, Austria, October 9-14, 2006 (invited lecture).

Feldman Yu. and Gelfgat A.Yu. “A novel multigrid approach for solving incompressible Navier-Stokes equations on massively parallel computers”, 29th Israel Symposium on Computational Mechanics, Haifa, Technion, October 14, 2010 (keynote lecture) .

Gelfgat A.Yu. "Computational modelling of instabilities of confined flows: concepts, achievements, benchmarks, and comparison with experiments", Workshop "Tipping Points in Complex Flows", Leiden, The Netherlands, October 31 – November 4, 2011.

Gelfgat A.Yu. "Destabilization of convection in Czochralski melt flow by slow rotation and by low-amplitude oscillations of crucible wall temperature", Collaborative Conference on Crystal Growth, Cancun, Mexico, June 10-13, 2013.

Gelfgat A.Yu. "Non-intrusive instability measurements in a model of Czochralski melt flow", Collaborative Conference on Crystal Growth, Hong Kong, China, December 14-17, 2015.

Gelfgat A.Yu. "Oscillatory instability of natural convection of air in a laterally heated cube: DNS vs linear stability analysis", 7th International Symposium on Advances in Computational Heat Transfer, Napoli, Italy, May 28 – June 2, 2017.

GRADUATE STUDENT SUPERVISED

M. Sc. students

Hvorova I.
"Galerkin Method for Solution of PDE Problems in Domains of Complicated Geometry". M.Sc. Thesis, Faculty of Physics and Mathematics, The University of Latvia. 1991 (in Russian).

Perlin A.

"Soldering of optical fiber in an optical device", M.Sc. without thesis, Faculty of Mechanical Engineering, Technion – Israel Institute of Technology, 2003-2004. Co-supervisor (together with Prof. G. Hetsroni).

Reuveni Yu.

"Study of counter-propagating Rossby waves in a stratified mixing layer". Tel-Aviv University, Dept. of Geophysics and Planetary Sciences, Faculty of Exact Sciences, 2003-2005 (together with Dr. E. Heifetz).

Fattal B.

"Computational model of melting driven by natural convection". Tel-Aviv University, School of Mechanical Engineering, Faculty of Engineering. 2004-2007.

Vitoshkin H.

"A computational study of modal and non-modal instability in parallel shear flows". Tel-Aviv University, School of Mechanical Engineering, Faculty of Engineering. 2005-2007.

Teitel M.

"Experimental observation of instabilities in a large Prandtl number Czochralski melt". Tel-Aviv University, School of Mechanical Engineering, Faculty of Engineering (co-supervisor, together with Prof. E. Kit). 2005-2007.

Gringrenovich S.

"Experimental study of parametrically forced mixing layer". Tel-Aviv University, School of Mechanical Engineering, Faculty of Engineering. 2005-2007.

Trevolsky E.

"Development of thermal packaging of an electronic block". M.Sc. without thesis. Tel-Aviv University, School of Mechanical Engineering, Faculty of Engineering. 2006-2008.

Shtein I.

"Experiments on natural ventilation under effect of wind and buoyancy". M.Sc. without thesis. Tel-Aviv University, School of Mechanical Engineering, Faculty of Engineering. 2006-2008.

Nedelko M.

"Numerical simulation of natural ventilation under effect of wind and buoyancy". M.Sc. without thesis. Tel-Aviv University, School of Mechanical Engineering, Faculty of Engineering. 2006-2008.

Tevelev A.

"Numerical simulation of convective flows around bodies". 2012 – 2014.

Burkin V.

“Application of diffusive interface approach to a thermocapillary-driven flow of two immiscible fluids in a rectangular cavity” 2014 – 2017.

Mendler D.

“"Wind effect on an induced flow air cooled condenser". 2017-2019

Nezhihovsky Y.

“Experiments on thermocapillary convection”. Started 2018.

Ph.D. students

Feldman Yu.

"Direct numerical simulation of supercritical convective flows". Tel-Aviv University, School of Mechanical Engineering, Faculty of Engineering. 2006-2010.

Shitrit S.

"Transonic flow computations by algebraic multigrid". Tel-Aviv University, School of Mechanical Engineering, Faculty of Engineering (co-supervisor together with Dr. D. Sidilkover). 2007-2010.

Haslavsky V.

"Experimental studies of Czochralski melt flow". Tel-Aviv University, School of Mechanical Engineering, Faculty of Engineering (co-supervisor together with Prof. E. Kit). 2007-2013.

Vitoshkin H.

"Computational modeling of two- and three-dimensional non-modal disturbances growth in homogeneous and stratified viscous mixing layer flows". Tel-Aviv University, School of Mechanical Engineering, Faculty of Engineering. 2007-2013.

Bukai M.
"Computational modeling of instabilities of convective flows around bodies". Started October 2012

SUPERVISION OF POST-DOCS AND REPATRIATED SCIENTISTS

Dr. Rubinov A. (repatriate scientist, 1999 - 2002)
“Krylov subspace iteration based methods for direct solution of stability problems in fluid dynamics”

Dr. Potapov A. (repatriate scientist, 2000 - 2001)
"Numerical Modeling of Crystallization Processes Affected by Melt Flow and Heat / Mass Transfer"

Dr. Erenburg V. (repatriate scientist, 1998 - 2003)
"Transport Phenomena in Microgravity"

Dr. Punjabi S. (post-doctoral researcher, June 2005 – June 2006)
"Instabilities of confined flows driven by convection and rotation"

Vorobyov R. (post-doctoral researcher, January – December 2007),
"Effect of radiative heat transfer on the growth of optical crystals"

Orr Gilad (post-doctoral researcher, August 2013 – August 2014),
"Laboratory modelling of melt flows in Czochralski model device"

Barmak Ilya (post-doctoral researcher, October 2020 – October 2021),
"Instabilities in two-phase stratified flows"

RESEARCH GRANTS

External funds

1992 - 1993: MONBUSHO (Ministry of Education, Science, Sports and Culture of Japan) Grant No.92024, "**Numerical Investigation of Convection in Electromagnetic Field**" (with Prof. I. Tanasawa of Tokyo University). 1,000,000 yen .

1995 - 1997: German-Israeli Foundation for Scientific Research and Development. Grant No. I-284.046.10/93 . "**Influence of a Magnetic Field on the Oscillatory Instability of Buoyancy-Thermocapillary Convection in Long Horizontal Cavities**". (with Profs. A. Yarin and P. Bar-Yoseph of Technion, Drs. G. Gerbeth and J. Priede of Forschungzentrum Rossendorf). 273,500 DM.

1996 - 1998: MONBUSHO (Ministry of Education, Science, Sports and Culture of Japan) International Scientific Research Program "**Control of Transport Processes in Manufacturing of Materials**" (with Profs. I. Tanasawa and M. Nishio of Tokyo University, Prof. T. Maekawa of Toyo University, Prof. P. Bar-Yoseph of Technion, and Prof. Yu. Gelfgat of Institute of Physics, Latvian Academy of Sciences). 3,000,000 yen.

1997 - 1999: Israel Science Foundation. "**Axisymmetry Breaking Instabilities in Axially Symmetric Rotating Flows**" (with Profs. P. Bar-Yoseph and A. Solan). Grant No.110/96-1. $70,000.

1998-2000: Ministry of Science, Israel. "**Numerical Modeling of Electromagnetic Control of the Production of Monocrystalline Materials**" (with Profs. P. Bar-Yoseph, A. Solan (Technion) and E. Kit (Tel-Aviv University). $150,000.

1999-2001: Binational Science Foundation. "**Hydrodynamics and Mass Transfer in a Novel Bioseparation / Bioreactor Design: Numerical and Experimental Study**" (with Profs. A. Yarin, P. Bar-Yoseph, M. Graham and E. Lightfoot). $50,0000 per year.

2001-2005: Israel Science Foundation. "**Transitional Phenomena in Stratified Shear Flows**". (with Profs. E. Kit and I. Wignyansky). $50,0000 per year.

2003: Center for Academic and Educational Relations with the C.I.S. and the Baltic States. "**Electromagnetic control of semiconductor crystal growth processes: experimental and computational modeling**". 30,000 NIS per 1 year.

2005-2007: German-Israeli Foundation for Scientific Research and Development. **"Experimental and numerical study of hydrodynamic instabilities during growth of optical crystals from the melt**" (PI, with Prof. E. Kit) €75,000 for 3 years for Israeli team.

2005: Ministry of National Infrastructures**. "Numerical Study of Confined Vortex Flow in Steam-Air Swirler".** (together with Prof. N. Eisenberg, Jerusalem College of Technology)**.** 60,000 NIS for 6 months.

2006-2008: Israel Science Foundation. "**Experimental and numerical study of thermal and mechanical control of BBO crystal growth from solutions**" (PI, together with Prof. M. Roth, Hebrew University of Jerusalem). 198,000 NIS per year.

2005-2009: Binational Science Foundation. **"Relating spatial to temporal instability of meteorological shear flows"** (PI, together with Dr. E. Heifetz (TAU) and Prof. H. Fernando (ASU)). $35,000 per year.

2008-2009: Ministry of Science, Culture and Sport, Israel (cooperation with France). **"Development of novel ideas for Navier-Stokes solvers",** Euro 10,000 for 2 years.

2009-2010: Ministry of Science, Culture and Sport, Israel (cooperation with France). **"Improving scalability of state-of-the-art computational fluid dynamics by state-of-the-art numerical linear algebra",** NIS 156,000 for 2 years.

2009-2011: German-Israeli Foundation for Scientific Research and Development. **"Experimental and numerical study of hydrodynamic instabilities during growth of optical crystals from the melt**", continuation grant (PI, with Prof. E. Kit) €94,700 for 3 years for Israeli team.

2009-2010: EU FP7 Marie Curie Actions. **"Computational modelling of electromagnetic control of melt flows and heat/mass transfer during manufacturing of bulk photovoltaic materials**", mobility grant for one-year stay at the University of Nottingham. €121,700

2018-2022: Israel Science Foundation. " **Comprehensive cross-validated study of instabilities in Poiseuille flow of two immiscible stratified fluids in circular pipes**" (PI, together with Prof. N. Brauner, Tel-Aviv University). 270,000 NIS per year.

Internal TAU and Technion funds

2001: Norman and Helen Asher Space Research Institute. "**Processes of Heat and Mass Transfer in Microgravity**", (with Profs. A. Solan and P. Bar-Yoseph). $10,0000 per 1 year.

2003: Gordon Center for Energy Studies. **"Low energy consumptions electromagnetic control of fluid flows in bulk crystal growth processes**". $5,000 per 1 year.

2005: Gordon Center for Energy Studies. **"Numerical modeling of confined swirling flow in steam-air vortex energizer of steam-enhanced vortex plant"**. $2,500 per 1 year.

2006: Gordon Center for Energy Studies. **"Numerical modeling of spatially developing instabilities around a system of wind power stations",** $8,000 per 1 year.

2011: Gordon Center for Energy Studies. **"Electromagnetically controlled growth of striations-free photovoltaic semiconductor materials ",** $6,000 per 1 year.

PERSONAL CONTRACTS:

01.12.1993 – 31.03.1994: Contract with Research Center Rossendorf, Germany. “Numerical simulation of thermocapillary drop migration”.

01.01.2001 – 31.12.2003: Consultancy contract with Hertwich Engineering GmbH, Austria. “Numerical modeling of MHD liquid metal flows”.

28.05.2014 – 27.15.2019: Consultancy contract with MGT Ltd, Israel. “Numerical modeling of flows in helical pipes”.

19.04.2017 – 31.03.2018: Publishing contract with Springer International Publishing AG. Preparation of a review book “Computational Modeling of Bifurcations and Instabilities in Fluid Mechanics”.

PUBLICATIONS:

Books edited

Studies of Flow Instabilities in Bulk Crystal Growth, ed. A. Gelfgat, Transworld Research Network, 2007.

Computational Modelling of Bifurcations and Instabilities in Fluid Dynamics, ed. A. Gelfgat, Springer, 2018.

Chapters in books

1. Gelfgat A.Yu. 1998. On Different Modes of Rayleigh-Bénard Instability in Two- and Three-Dimensional Rectangular Enclosures. *In: Continuation methods in Fluid Dynamics, eds. D. Henry and A. Bergeon,* Vieweg, 1998, pp.119-132.
2. Gelfgat A.Yu. 2007. Numerical Study of Three-Dimensional Instabilities of Czochralski Melt Flow Driven by Buoyancy Convection, Thermocapillarity and Rotation. *In: Studies of Flow Instabilities in Bulk Crystal Growth*, ed. A. Gelfgat, Transworld Research Network, 2007, pp. 57-82.
3. Gelfgat A.Yu. On acceleration of Krylov-subspace-based Newton and Arnoldi iterations for incompressible CFD: replacing time steppers and generation of initial guess. *In: Computational Modelling of Bifurcations and Instabilities in Fluid Dynamics*, ed. A. Gelfgat, Springer, 2018, pp. 147-167.
4. Gelfgat A.Yu. Global Galerkin method for stability studies in incompressible CFD and other possible applications. *In: Computational Modelling of Bifurcations and Instabilities in Fluid Dynamics*, ed. A. Gelfgat, Springer, 2018, pp. 353-398.

Refereed papers in professional journals:

1. Gelfgat A.Yu. and Perets I.V. 1987. Suppression of forced and convective flows of a stably stratified fluid in vertical channels, *Mechanika Zhidkosti i Gaza*, 1987, No.2, 172-174 (rus., English translation in*: Fluid Dynamics*, 1987, **22**(2) 310-312).
2. Gelfgat A.Yu. 1988. Effects of the magnetic field magnitude and direction on the oscillatory thermogravitational convection regimes in a rectangular cavity, *Magnetic Hydrodynamics*, 1988, No.3, 70-75 (rus., English translation in: *Magnetohydrodynamics*, 1988, **24**(3) 324-328).
3. Gelfgat A.Yu. and Martuzans B.J. 1990. Investigation of thermogravitational-thermocapillary steady-state convective flow stability at low Prandtl numbers, *Mechanika Zhidkosti i Gaza,* 1990, No.2, 8-12 (rus., English translation in: Fluid Dynamics, 1990, **25**(2) 169-174).
4. Gelfgat A.Yu. 1990. The magnetic field as it affects the three-dimensional structure of the self-oscillation regimes in free convection, *Magnitnaya Gidrodynamika*, 1990, No.1, 13-22 (rus., English translation in: *Magnetohydrodynamics*, 1990, 26(1), 8-16).
5. Gelfgat A.Yu. 1991. Development and instability of steady convective flows in the square cavity heated from below in a field of vertically directed vibration forces, *Mechanika Zhidkosti i Gaza*, 1991, No.2, 8-12 (rus., English translation in: *Fluid Dynamics*, 1991, **26**(2), 165-172).

6. Gelfgat A.Yu. and Tanasawa I. 1994. Numerical analysis of oscillatory instability of buoyancy convection with the Galerkin spectral method, *Numerical Heat Transfer. Part A: Applications*, **25**(6), 627-648.
7. Gelfgat A.Yu. and Tanasawa I. 1995. Numerical investigation of the thermocapillary drift of a bubble in an electric field, *Microgravity Science and Technology*, **8**(1), 16-22.
8. Gelfgat A.Yu., Bar-Yoseph P.Z. and Solan A. 1996. Stability of confined swirling flow with and without vortex breakdown, *Journal of Fluid Mechanics*, **311**, 1-36.
9. Gelfgat A.Yu., Bar-Yoseph P.Z. and Solan A. 1996. Steady states and oscillatory instability of swirling flow in a cylinder with rotating top and bottom, *Physics of Fluids*, **8**(10), 2614-2625.
10. Gelfgat A.Yu., Bar-Yoseph P.Z. and Yarin A.L. 1997. On oscillatory instability of convective flows at low Prandtl number, *Journal of Fluids Engineering,* **119**, 823-830.
11. Gelfgat A.Yu., Bar-Yoseph P.Z. and Yarin A.L. 1999. Stability of multiple steady states of convection in laterally heated cavities, *Journal of Fluid Mechanics*, **388**, 315-334.
12. Gelfgat A.Yu., Bar-Yoseph P.Z. and Yarin A.L. 1999. Non-Symmetric convective flows in laterally heated rectangular cavities, *Int. J. Computational Fluid Dynamics*, **11**, 261-273.
13. Gelfgat A.Yu. 1999. Different modes of Rayleigh-Bénard instability in two- and three-dimensional rectangular enclosures, *Journal of Computational Physics*. **156**, 300-324.
14. Priede J., Cramer A., A.Bojarevics, Gelfgat A.Yu., Bar-Yoseph P.Z., Yarin A.L., Gerbeth G. 1999. Experimental and numerical study of anomalous thermocapillary convection in liquid gallium, *Physics of Fluids*, **11**, 3331-3339.
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57. Gelfgat A.Yu. and Molokov S. 2011. Quasi-two-dimensional convection in a 3D laterally heated box in a strong magnetic field normal to main circulation, *8th PAMIR International Conference on Fundamental and Applied MHD*, Borgo, France, September 5-9, 2011.
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73. Gelfgat A. Yu. "Large azimuthal wavenumber instabilities in a small height/radius ratio rotating disk – cylinder configuration (rotor-stator cavity)", 10th European Fluid Mechanics Conference, Copenhagen, Denmark, September 14-18, 2014.
74. Miroshnichenko E., Haslavsky V. , Kit E. , Gelfgat A. Yu. 2014. "Scaling laws for instabilities in Czochralski crystal growth configuration at large Prandtl numbers", 10th European Fluid Mechanics Conference, Copenhagen, Denmark, September 14-18, 2014.
75. Miroshnichenko E., Haslavsky V. , Kit E. , Gelfgat A. Yu. 2014. " Experimental study of instabilities in Czochralski configuration at large Prandtl numbers", 6th International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Paris, France, July 15-17, 2015.
76. Barmak I., Gelfgat A., Ullmann A. and Brauner N., "Stability analysis of stratified two-phase flows in horizontal and inclined channels", 6th International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Paris, France, July 15-17, 2015.
77. Molokov S., Gelfgat A. Yu., Bühler L., Mistrangelo C., Pedcenko A., "Instabilities in quasi-two-dimensional convection in ducts in a strong magnetic field", International Conference on Electromagnetic Processing of Materials, Cannes, France, October 12-16 , 2015.
78. Brauner N., Ullmann A., Gelfgat A., Barmak I., Kushnir R., 2015. "Stability of Stratified Flow in Inclined Channels: Exact analysis and mechanistic models", the 7th European-Japanese Two-Phase Flow Group Meeting, October 11-15, Zermatt, Switzerland.
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85. Gelfgat A. “Linear stability of the lid-driven flow in a cube”, 7th International Symposium "Bifurcations and Instabilities in Fluid Dynamics", 11-14 July, SHSU, The Woodlands, TX, USA.
86. Haslavsky V., Miroshnichenko E., Gelfgat A.Yu., Kit E. 2017. “Instability of large Prandtl number Czochralski melt flow: capillary meniscus height effect”, 9th World Conference on Experimental Heat Transfer, Fluid Mechanics and Thermodynamics 12-15 June, 2017, Iguazu Falls, Brazil
87. Burkin V., Gelfgat A. Yu. 2017 “Application of diffusive interface method to thermocapillary - driven flow of two immiscible fluids,” *The 42nd Israeli Symposium on Computational Mechanics,* Haifa, Technion, March 30, 2017.
88. Gelfgat A., Zikanov O. 2018. Computational modeling of magnetoconvection in a cube with lateral heating. *12th Eur. Fluid Mech. Conf.,* Vienna, Austria, Sept. 9-1-3, 2018.

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2. Gelfgat A.Yu. and Martuzans B. 1985. Stability of thermocapillary convection in liquid cylinder created by an external heater with axial temperature gradient (rus*), Applied Problems of Mathematical Physics.* University of Latvia, 73-82.
3. Gelfgat A.Yu. and Martuzans B. 1987. Oscillatory convective flows in laterally heated square cavity (rus.), *Transport Processes in Forced and Free Convective Flows*, Institute of Thermophysics, Novosibirsk, 108-117.
4. Gelfgat A.Yu. 1987. A variational method for solution of the fluid flow problems in rectangular enclosures (rus.), *Applied Problems of Mathematical Physics.* (rus.) University of Latvia, 14-24.
5. Gelfgat A.Yu. and Martuzans B. 1988. Stability and oscillatory supercritical regimes of the natural convection in the laterally heated rectangular cavity (rus.)*, Applied Problems of Mathematical Physics*. University of Latvia, 31-40.
6. Gelfgat A.Yu. 1989. Solution of thermal convection problems with Galerkin technique: test calculations (rus.), *Applied Problems of Mathematical Physics*. University of Latvia, 46-55.
7. Gelfgat A.Yu. and Tanasawa I. 1993 Systems of basis functions for calculation of three-dimensional fluid flows in cylindrical containers with the Galerkin spectral method, *Proc. of Institute of Industrial Science*, The Univ. of Tokyo, vol. 45, No.8, pp.60-63.

PARTICIPATION IN ORGANIZING OF CONFERENCES

Organizing:

1998 Computational Mechanics Session, 27th Israel Conference on Mechanical Engineering, Technion, Haifa, May, 1998.

2003 29th Israel Mechanical Engineering Conference. Member of Program Committee.

2003 15th IACMM Congress on Computational Mechanics. Member of Organizing Committee.

2004 International Conference on Computational and Experimental Engineering and Sciences. Co-organizes of minisimposium "Instabilities and Bifurcations in Fluid Mechanics".

2006 Graduate Students Conference, School of Mechanical Engineering, Faculty of Engineering, Tel Aviv University.

2006 20th IACMM Congress on Computational Mechanics. Member of Organizing Committee.

2006 Second International Symposium on Instabilities and Bifurcations in Fluid Dynamics. Member of Organizing Committee.

2006 Workshop "Conceptual Aspects of Hydrodynamic Stability". Member of Organizing Committee.

2008 24th IACMM Congress on Computational Mechanics. Member of Organizing Committee.

2008 9th Biennial ASME Conference on Engineering Systems Design and Analysis. Track chair, session “Computational Mechanics”.

2009 7th World Conference on Experimental Heat Transfer, Fluid Mechanics and Thermodynamics. Member of Scientific Committee.

2009 3rd International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Member of Organizing Committee.

2011 30th IACMM Congress on Computational Mechanics. Member of Organizing Committee.

2011 4th International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Member of Organizing Committee.

2012 6th Conference of the International Marangoni Association “Interfacial Phenomena in Fluid Mechanics”. Member of Organizing Committee.

2013 8th World Congress on Experimental Heat Transfer, Fluid Mechanics and Thermodynamics. Member of Scientific Committee.

2013 5th International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Member of Organizing Committee.

2014 7th Conference of the International Marangoni Association “Interfacial Phenomena in Fluid Mechanics”. Member of Scientific Committee.

2014 21st Fluid Mechanics Conference. Member of Scientific Committee.

2014 7th IMA Conference. Member of Scientific Committee.

2014 37th IACMM Congress on Computational Mechanics. Member of Organizing Committee.

2015 6th International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Member of Organizing Committee.

2015 1st International Conference on Computing in Mechanical Engineering (ICCME 2015), August 10-13, 2015, Kochi, India . Member of Technical Committee.

2017 7th International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Member of Advisory Committee.

2019 8th International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Member of Advisory Committee.

Chairmanship:

1996 Chairman, Computational Mechanics Session, 26th Israel Conference on Mechanical Engineering, Technion, Haifa, May 21-22, 1996.

1997 co-Chairman, Session 28, 10th International Symposium on Transport Phenomena in Thermal Science and Engineering. Kyoto, November 30-December 4, 1997.

1998 Chairman, Computational Mechanics Session, 27th Israel Conference on Mechanical Engineering, Technion, Haifa, May, 1998.

Chairman, Session #4 "Convection", ERCOFTAC/EUROMECH Colloquium 383 "Continuation Methods in Fluid Dynamics", Aussois, France, September 6-9, 1998.

1999 Chairman, Session "Incompressible Flows", 8th International Symposium on Computational Fluid Dynamics, Bremen, September 5-10, 1999.

2000 Chairman. Session "Application of Vortical Flows", 11th International Couette Taylor Workshop, Evanston, IL, USA, September 6-8, 2001.

2002 Chairman, Afternoon session, Twelfth Israel Symposium on Computational Mechanics, Technion, Haifa, Israel, April 11, 2002.

2003 Chairman, Heat and Mass Transfer Session, 29th Israel Conference on Mechanical Engineering, Technion, Haifa, May, 2003.

Chairman, Afternoon Session, 15th Meeting of Israel Association for Computational Mechanics, Tel-Aviv University, October 2003.

2006 Chairman, Bioengineering Session, 20th IACMM Congress on Computational Mechanics.

Chairman, Natural Convection Session, 2nd International Symposium on Instabilities and Bifurcations in Fluid Dynamics, Lyngby, Denmark, August 15-28, 2006.

2008 Chairman, Afternoon Session, 24th Meeting of Israel Association for Computational Mechanics, Tel-Aviv University, April 2008.

Chairman, COST meeting "MHD fundamentals, from liquid-metals to astrophysics", Brussels, April 14-16, 2008.

2009 Chairman, plenary session, 3rd International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Nottingham, UK, August 10-14, 2009.

2011 Chairman, Afternoon Session, 30th Meeting of Israel Association for Computational Mechanics, Tel-Aviv University, March 2011.

2011 Chairman, sessions "Multiphase flows" and "Bifurcations and Instabilities in Technological Applications", 4th International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Barcelona, Spain, July 18-21, 2011.

2012 Chairman, session "Fluid flow and Visualization", 9th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics. Malta, July 16-18, 2012.

2012 Chairman, session "Global Instability Analysis", 5th Symposium of Global Flow Instability and Control, Hersonissos, Crete, September 19-22, 2012.

2012 Chairman, session “Hydrodynamic Instabilities”, *The 32nd Israeli Conference on Mechanical Engineering,* Tel-Aviv, October 17-18, 2012.

2013 Chairman, session "Nanostructures", Collaborative Conference on Crystal Growth, Cancun, Mexico, June 10-13, 2013.

2013 Chairman, session "Instabilities in technological applications", 5th International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Haifa, Israel, July 8-12, 2013.

2014 Chairman, Morning Session, 36th Meeting of Israel Association for Computational Mechanics, Technion, April 24, 2014.

2014 Chairman, session "Complex flows", 21st Fluid Mechanics Conference, Krakow, Poland, June 15-18, 2014.

2014 Chairman, session "Instability", 10th European Fluid Mechanics Conference, Copenhagen, Denmark, September 14-18, 2014.

2014 Chairman, Afternoon Session, 37th Meeting of Israel Association for Computational Mechanics, Tel-Aviv University, October 23, 2014.

2015 Chairman, session “Natural convection”, 6th International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Paris, France, July 17-19, 2015.

2015 Chairman, session “General topics VI”, Collaborative Conference on Crystal Growth, Hong Kong, China, December 14-17, 2015.

2016 Chairman, Morning Session, 40th Meeting of Israel Association for Computational Mechanics, Tel-Aviv University, April 5, 2016.

2017 Chairman, Session “Natural convection”, 7th International Symposium on Advances in Computational Heat Transfer, Napoli, Italy, May 28 – June 2, 2017.

2017 Chairman, session “Plenary session #5”, 7th International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Woodlands, TX, USA, July 11-14, 2017.

2017 Chairman, session “Technological applications and rotating flows”, 7th International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Woodlands, TX, USA, July 11-14, 2017.

2018 Chairman, session “Magnetohydrodynamics”, 12th European Fluid Mechanics Conference. Vienna, Austria, September 9-13, 2018.

2019 Chairman, session “Instabilities in crystal growth”, 8th International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Limerick, Ireland, July 11-14, 2019.

2019 Chairman, session “Convection heat transfer”, 14th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics. Wicklow, Ireland, July 22-24, 2019.