

**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),<br>972-54-4749702 (cell) |
| Fax                      | 972-3-6407334   |
| E-mail                   | gelfgat@eng.tau.ac.il   |

**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 –<br>August<br>1992    | Senior Researcher, Department of Mathematical Physics, Institute of Mathematics and Computer Science, University of Latvia  |
| August 1992 -<br>August 1993   | Post-doctoral Fellow, Institute of Industrial Science, University of Tokyo.   |
| March 1994 –<br>March 2000     | Research Associate, Faculty of Mechanical Engineering, Technion   |
| June 1999                      | Visiting Fellow, Institute of Fundamental Technological Research, Polish Academy of Sciences  |
| April 2000 –<br>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 –<br>April 2006   | Senior Lecturer, Department of Fluid Dynamics and Heat Transfer, Faculty of Engineering, Tel-Aviv University.   |
| April 2006 –<br>August 2011    | Associate Professor with tenure, School of Mechanical Engineering, Faculty of Engineering, Tel-Aviv University.   |
| August 2009 –<br>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.
- 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, 2012, 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, Department of Fluid Mechanics and Heat Transfer. "Fluid Mechanics - 1", Spring semester 2006, 2007-2009, 2011, 2012, Lecturer.
- Tel Aviv University, Department of Fluid Mechanics and Heat Transfer. "Advanced Fluid Mechanics," Spring semester 2011, 2012, Lecturer.

## PUBLIC PROFESSIONAL ACTIVITIES:

### Reviewer for journals:

Journal of Fluid Mechanics  
Physics of 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  
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  
Chemical Engineering Science  
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  
Journal of Zhejiang University – Science A (*published by Springer*)

**Reviewer for conferences:**

- 2nd International Symposium on Two-Phase Flow Modeling and Experimentation. Pisa, Italy, May 23-25, 1999.
- 8<sup>th</sup> International Symposium on Computational Fluid Dynamics. Bremen, Germany, September 5-10, 1999.
- 14<sup>th</sup> International Crystal Growth Conference, Grenoble, France, August 9-13, 2004.
- 13<sup>th</sup> International Heat Transfer Conference, Sydney, Australia, August 13-18, 2006.
- 7<sup>th</sup> PAMIR International Conference on Fundamental and Applied MHD, Presqu'île de Giens - France, September 8 - 12, 2008.
- 3<sup>rd</sup> International Symposium "Bifurcations and Instabilities in Fluid Dynamics", Nottingham, UK, August 10-13, 2009.

- 4<sup>th</sup> International Symposium "Bifurcations and Instabilities in Fluid Dynamics", Barcelona, Spain, July 18-21, 2011.
- 6<sup>th</sup> Conference of the International Marangoni Association "Interfacial Phenomena in Fluid Mechanics". Technion, Haifa, Israel, June 18-21, 2012.
- 9<sup>th</sup> International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, Malta, July 16-18.
- 5<sup>th</sup> International Symposium "Bifurcations and Instabilities in Fluid Dynamics. Technion, Haifa, Israel, July 8-11, 2013.

### **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

### **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   |
| 2009 to date | - The Open Numerical Methods Journal (Open access)   |
| 2010 to date | - ISRN Mechanical Engineering Journal (Open access)  |
| 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. |

### **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, 11<sup>th</sup> 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 “Développement 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

## INVITED LECTURES

- Gelfgat A.Yu. “Two- and Three-dimensional Instabilities of Confined Flows: Numerical Study by a Global Galerkin Method”, 8<sup>th</sup> 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", 14<sup>th</sup> 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", 29<sup>th</sup> 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", 23<sup>rd</sup> 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", Vienna, 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", 29<sup>th</sup> 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.

## **GRADUATE STUDENT SUPERVISED**

### M. Sc. students

**Hvorova I.** (M.Sc., Faculty of Physics and Mathematics, University of Latvia)

"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.** (M.Sc., Faculty of Mechanical Engineering, Technion)

"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.** (M.Sc., Department of Geophysics, Tel-Aviv University)

"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.** (M.Sc., School of Mechanical Engineering, Tel-Aviv University)

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

**Vitoshkin H.** (M.Sc., School of Mechanical Engineering, Tel-Aviv University)

"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.** (M.Sc., School of Mechanical Engineering, Tel-Aviv University)

"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.** (M.Sc., School of Mechanical Engineering, Tel-Aviv University)

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

**Trevolsky E.** (M.Sc., School of Mechanical Engineering, Tel-Aviv University)

"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.** (M.Sc., School of Mechanical Engineering, Tel-Aviv University)

"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.** (M.Sc., School of Mechanical Engineering, Tel-Aviv University)

"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.

#### Ph.D. students

**Feldman Yu.** (Ph.D., School of Mechanical Engineering, Tel-Aviv University)

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

**Shitrit S.**, ( Ph.D., School of Mechanical Engineering, Tel-Aviv University)

"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.**, ( Ph.D., School of Mechanical Engineering, Tel-Aviv University)

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

**Vitoshkin H.** (Ph. D., School of Mechanical Engineering, Tel-Aviv University)



"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. Started in 2007.

### **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"

**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 Forschungszentrum 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) €4,700 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

#### 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). \$10,000 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".

**PUBLICATIONS:****Book edited**

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

**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.

**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.
15. Gelfgat A.Yu., Bar-Yoseph P.Z., Solan A., Kowalewski T. 1999. An axisymmetry- breaking instability in axially symmetric natural convection, *International Journal of Transport Phenomena*, **1**, 173-190.
16. Gelfgat A.Yu., Bar-Yoseph P.Z., and Solan A. 2000. Axisymmetry breaking instabilities of natural convection in a vertical Bridgman growth configurations, *Journal of Crystal Growth*, **220**, 316-325.
17. Gelfgat A.Yu. 2001. Two- and three-dimensional instabilities of confined flows: numerical study by a global Galerkin method, *Computational Fluid Dynamics Journal*, **9**, 437-448.
18. Gelfgat A.Yu., Bar-Yoseph P.Z., and Solan A. 2001. Three-dimensional instability of axisymmetric flow in a rotating lid - cylinder enclosure, *Journal of Fluid Mechanics*, **438**, 363-377.
19. Gelfgat A.Yu., Bar-Yoseph P.Z., and Solan A. 2001. Effect of axial magnetic field on three-dimensional instability of natural convection in a vertical Bridgman growth configuration, *Journal of Crystal Growth*, **230**, 63-72.
20. Gelfgat A.Yu. and Bar-Yoseph P.Z., 2001. The effect of an external magnetic field on oscillatory instability of convective flows in a rectangular cavity, *Physics of Fluids*, **13**, 2269-2278.
21. Gelfgat A.Yu., Yarin A.L., and Bar-Yoseph P.Z. 2001. Three-dimensional instability of a two-layer Dean flow, *Physics of Fluids*, **13**, 3185-3195.
22. Yarin A.L., Gelfgat A.Yu. and Bar-Yoseph P.Z. 2002. Enhancement of mass transfer in a two-layer Taylor-Couette apparatus with axial flow, *Int. J. Heat and Mass Transfer*, **45**, 555-570.
23. Gelfgat A.Yu. 2002. Three-dimensionality of trajectories of experimental tracers in a steady axisymmetric swirling flow: effect of density mismatch, *Theoretical and Computational Fluid Dynamics*, **16**, 29-41.
24. Gelfgat A.Yu., Yarin A.L., and Bar-Yoseph P.Z. 2003. Dean vortices – induced enhancement of mass transfer through an interface separating two immiscible liquids, *Physics of Fluids*, **15**, 330-347.
25. Gelfgat A.Yu., Yarin A.L., and Bar-Yoseph P.Z. 2003. Convection – induced enhancement of mass transfer through an interface separating two immiscible liquids in a two-layer horizontal annulus, *Physics of Fluids*, **15**, 790-800.
26. Marques F., Gelfgat A.Yu., and Lopez J. M. 2003. Tangent double Hopf bifurcation in a differentially rotating cylinder flow, *Physical Review E*, **68**, pp. 06310-1 – 06310-13 .
27. Erenburg V., Gelfgat A.Yu., Kit E., Bar-Yoseph P.Z., and Solan A. 2003. Multiple states, stability and bifurcations of natural convection in rectangular cavity with partially heated vertical walls, *Journal of Fluid Mechanics*, **492**, 63-89.

28. Gelfgat A.Yu. 2004. Stability and slightly supercritical oscillatory regimes of natural convection in a 8:1 cavity: solution of benchmark problem by a global Galerkin method, *Int. J. Numerical Methods in Fluids*, **44**, 135-146.
29. Gelfgat A.Yu., Bar-Yoseph P.Z. 2004. Multiple solutions and stability of confined convective and swirling flows – a continuing challenge, *Int. J. Numer. Meth. Heat and Fluid Flow*, **14**, 213-241.
30. Gelfgat Yu.M., Gelfgat A.Yu. 2004. Experimental and numerical study of rotating magnetic field driven flow in cylindrical enclosures with different aspect ratios, *Magnetohydrodynamics*, **40**, 147-160.
31. Rubinov A., Erenburg V., Gelfgat A.Yu., Kit E., Bar-Yoseph P.Z., Solan A. 2004. Three-dimensional instabilities of natural convection in a vertical cylinder with partially heated sidewalls, *Journal of Heat Transfer*, **126**, 586-599.
32. Gelfgat A.Yu., Yarin A.L., Bar-Yoseph P.Z., Graham M., Bai G. 2004. Numerical modeling of two-fluid Taylor-Couette flow with deformable capillary liquid-liquid interface, *Physics of Fluids*, **16**, 4066-4074.
33. Gelfgat A.Yu., Rubinov A., Bar-Yoseph P.Z., Solan A. 2005. Numerical study of three-dimensional instabilities in a hydrodynamic model of Czochralski growth, *Journal of Crystal Growth*, **275**, e7-e13.
34. Gelfgat A.Yu. 2005. On three-dimensional instability of a traveling magnetic field driven flow in a cylindrical container, *J. Crystal Growth*, **279**, 276-288.
35. Gelfgat A.Yu., Rubinov A., Bar-Yoseph P.Z., Solan A. 2005. On the Three-Dimensional Instability of Thermocapillary Convection in Arbitrary Heating Floating Zones in Microgravity Environment, *Fluid Dynamics & Material Processing*, **1**, 21-31.
36. Gelfgat A.Yu. 2006. Implementation of arbitrary inner product in global Galerkin method for incompressible Navier-Stokes equation, *J. Comput. Phys.*, **211**, 513-530.
37. Heifetz E., Reuveni Y., Gelfgat A. Yu., Kit E. 2006. The counter-propagating Rossby wave perspective of Kelvin-Helmholtz instability a limiting case of a Rayleigh shear layer with zero width, *Physics of Fluids*, **18**, 01801-1 – 01801-4.
38. Gelfgat A.Yu. and Kit E. 2006. Spatial versus temporal instabilities in a parametrically forced stratified mixing layer, *J. Fluid Mech*, **552**, 189-227.
39. Gelfgat A. Yu. 2007. Stability of convective flows in cavities: solution of benchmark problems by a low-order finite volume method, *Int. J. Numer. Meths. Fluids*, **53**, 485-506.
40. Gelfgat A. Yu. 2007. Three-Dimensional Stability Calculations for Hydrodynamic Model of Czochralski Growth, *J. Cryst. Growth*, **303**, 226-230.
41. Gelfgat A. Yu. 2007. Three-dimensional instability of axisymmetric flows: solution of benchmark problems by a low-order finite volume method, *Int. J. Numer. Meths. Fluids*, **54**, 269-294.
42. Teitel M., Schwabe D., Gelfgat A.Yu. 2008. Experimental and computational study of flow instabilities in a model of Czochralski growth, *J. Cryst. Growth*, **310**, 1343-1348.
43. Crnogorac N., Wilke H., Cliffe K. A., Gelfgat A. Yu., and Kit E. 2008. Numerical modelling of instability and supercritical oscillatory states in a Czochralski model system of oxide melts, *Crystal Research and Technology*, **43**, 606-615.
44. Feldman Yu. and Gelfgat A. Yu. 2009. On pressure-velocity coupled time-integration of incompressible Navier-Stokes equations using direct inversion of Stokes operator or accelerated multigrid technique, *Computers & Structures*, **87**, 710-720.
45. Sørensen J. N., Gelfgat A. Yu., Naumov I. V., and Mikkelsen R. F. 2009. Experimental and numerical results on three-dimensional instabilities in a rotating disk–tall cylinder flow, *Physics of Fluids*, **21**, 054102, 5pp.

46. Kit E., Gerstenfeld D., Gelfgat A.Y., and Nikitin N.V. 2010. Bulging and bending of Kelvin-Helmholtz billows controlled by symmetry and phase of initial perturbation. *Journal of Physics: Conference Series*, **216**, 012019, 21pp.
47. Feldman Yu. and Gelfgat A.Yu. 2010. Oscillatory instability of a 3D lid-driven flow in a cube. *Physics of Fluids*, **22**, 093602.
48. Shitrit S., Sidilkover D., and Gelfgat A.Yu. 2010. An algebraic multigrid solver for transonic flow problems. *Journal of Computational Physics*, **230**, 1707-1729.
49. 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. *Physics of Fluids*, **23**, 034101.
50. Haslavsky V., Miroshnichenko E., Kit E., and Gelfgat A. Yu. 2011. On experimental and numerical prediction of instabilities in Czochralski melt flow configuration. *Journal of Crystal Growth*, **318**, 156-161.
51. Feldman Yu. and Gelfgat A.Yu. 2011. From multi- to single-grid CFD on massively parallel computers: numerical experiments on lid-driven flow in a cube using pressure-velocity coupled formulation. *Computers & Fluids*, **46**, 218-223.
52. Liberzon A., Feldman Yu., and Gelfgat A. Yu. 2011 Experimental observation of the steady – oscillatory transition in a cubic lid-driven cavity. *Physics of Fluids*, **23**, 084106.
53. Gelfgat A.Yu. 2011 Destabilization of convection by weak rotation. *Journal of Fluid Mechanics*, **685**, 377-412.
54. Vitoshkin H., Heifetz E., Gelfgat A. Yu., Harnik N. 2012 On the role of vortex stretching in optimal growth of three dimensional perturbations on plane parallel shear flows, *Journal of Fluid Mechanics*, **707**, 369-380.

#### Book Reviews in refereed professional journals

1. Gelfgat A. Yu. 2011. Marcello Lappa: Thermal convection: patterns, evolution and stability. Book Review. *Crystal Research and Technology*, **46**, 891-892.

#### Submitted papers:

1. Vitoshkin H., Gelfgat A. Yu. 2012 On direct inverse of Stokes, Helmholtz and Laplacian operators in view of time-stepper-based Newton and Arnoldi solvers in incompressible CFD, *submitted to Journal of Computational Physics*.
2. Vitoshkin H., Gelfgat A. Yu. 2012 Non-modal disturbances growth in a viscous mixing layer flow, *submitted to Journal of Fluid Mechanics*.

#### Other publications

##### **(II) Extended Papers in Conference Proceedings**

1. Gelfgat A.Yu. and Martuzans B. 1989. Instability and oscillatory regimes of the natural convection in the laterally heated square cavity, *Proc. of the 6th Int. Conf. on Theor. Appl. Mech.*, Abstracts of Lectures, Varna, Bulgaria, September 20-24, 298-301
2. Gelfgat A.Yu. 1991. Numerical realization of the spectral Galerkin method with small number of modes for computation of convective problems in regions of simple geometry,. *Proceedings of the 1st ICHMT International Numerical Heat Transfer Conference and Software Show*. Guildford, Surrey, England. July 22-26, 167-177.

3. Gelfgat A.Yu. and Martuzans B. 1991. Influence of electromagnetic, g-jitter, and thermocapillary forces on the stability of the stationary buoyancy convection, *Proceedings of the IUTAM Symposium on Microgravity Fluid Mechanics*. Bremen, Germany, 2-6 September, 1991. Springer, 1992, 129-136.
4. Gelfgat A.Yu. Stability of quasi-stationary convective flows in time-modulated gravity field, *Proc. 2nd JSME-KSME Thermal Engineering Conference*. Kitakyushu, Japan, October 19-21, 1992, Vol. 3, 65-70.
5. Gelfgat A.Yu. 1993. Influence of the magnetic field on the oscillatory instability and supercritical regimes of buoyancy convection, *Proceedings of the Sixth International Symposium on Transport Phenomena in Thermal Engineering*. Seoul, Korea, May 9-13, 1993, 287-292.
6. Gelfgat A.Yu. and Tanasawa I. 1994. Influence of an electric field on the thermocapillary drift of a gas bubble, *Proc. 25th Israel Conference on Mechanical Engineering*. Haifa, Technion, 1994, 154-159.
7. Gelfgat A.Yu., Bar-Yoseph P.Z. and Solan A. 1995. Numerical investigation of a confined swirling flow in a cylinder with rotating top and bottom by the Galerkin spectral method, *Proc. 6th International Symposium on Computational Fluid Dynamics*, Lake Tahoe, Nevada, September 4-8, 355-360.
8. Gelfgat A.Yu., Bar-Yoseph P.Z. and Solan A. 1996. On steady and unsteady patterns in confined swirling flows. *Proc. 36th Israel Annual Conference on Aerospace Sciences*, Tel-Aviv/Haifa, February 23-24, Omanuth Press, 12-23 .
9. Gelfgat A.Yu., Bar-Yoseph P.Z. and Solan A. 1996. Confined swirling flow simulation using spectral Galerkin and finite volume methods, *Proc. 1996 ASME Fluids Engineering Division Conference*, San-Diego, CA, July 7-11, 1996, Vol.3, FED, **238**, 105-111.
10. Gelfgat A.Yu., Bar-Yoseph P.Z. and Yarin A.L. 1996. Numerical investigation of Hopf bifurcation corresponding to transition from steady to oscillatory state in a confined convective flow, *Proc. 1996 ASME Fluids Engineering Division Conference*, San-Diego, CA, July 7-11, 1996, Vol.2, FED, **237**, 369-374 .
11. Gelfgat A.Yu., Bar-Yoseph P.Z. and Yarin A.L. 1996. Oscillatory instability of buoyancy convection in long horizontal cavities, *Proc. 26th Israeli Mechanical Engineering Conference* , Technion City, Haifa, May 21-22, 45-47.
12. Gelfgat A.Yu., Bar-Yoseph P.Z. and Yarin A.L. 1997. Patterns of bifurcating convective flows in long horizontal cavities, *Proc. Int. Symp. on Advances in Computational Heat Transfer*. Cesme, Izmir, Turkey, May 26-30, 1997, Begell House, New York 1998, 403-410.
13. Gelfgat A.Yu., Bar-Yoseph P.Z. and Solan A.L. 1997. Axisymmetry-breaking instabilities of axially symmetric convective flows, *Proc. 10th Int. Conf. on Transport Phenomena in Thermal Science and Process Engineering*. Kyoto, December 1-4, 1997, Vol.1, 263-268.
14. Gelfgat A.Yu., Bar-Yoseph P.Z. and Yarin A.L. 1998. Multiplicity and stability of steady convective flows in laterally heated cavities, *Proc. 11th Int. Heat Transfer Conference*, Kyongju, Korea, August 23-28, 1998, vol.3, 435-440.
15. Gelfgat A.Yu., Bar-Yoseph P.Z. and Yarin A.L. 1998. Numerical investigation on bifurcating convective flows in long horizontal cavities, *Proc. 27th Israeli Mechanical Engineering Conference* , Technion City, Haifa, May 21-22, 133-135 .
16. Gelfgat A.Yu., Bar-Yoseph P.Z. and Solan A.L. 1998. Stability of axisymmetric convective flows with respect to three-dimensional perturbations, *Proc. 27th Israeli Mechanical Engineering Conference* , Technion City, Haifa, May 21-22, 315-317.
17. Gelfgat A.Yu. 1999. Global spectral approach to stability problems in continuum dynamics and transport processes, *Proc. European Conference on Computational Mechanics*, Munich, Germany, August 31-September 3, 1999, 1-20.



18. Erenburg V., Gelfgat A.Yu., Kit E., Bar-Yoseph P.Z. and Solan A. 2002. Natural convection in a rectangular cavity with piece-wise heated vertical walls: multiple states, stability and bifurcations, *12<sup>th</sup> Int. Heat Transfer Conf., Grenoble, France, August 18-23, 2002*.
19. Bar-Yoseph P.Z., Gelfgat A.Yu. Stability and bifurcation analysis for crystal growth processes, *Proc. 2004 Int. Conf. on Advances in Computational & Experimental Engineering & Sciences, July 30 – August 3, Madeira, Portugal*, pp. 976-981.
20. Kit E., Gelfgat A.Yu. Interconnection between spatial and temporal instability in a forced mixing layer, *Proc. 2004 Int. Conf. on Advances in Computational & Experimental Engineering & Sciences, July 30 – August 3, Madeira, Portugal*, pp. 1052-1057.
21. Gelfgat A.Yu., Kit E. Skin-effect influence on three-dimensional instability of a traveling magnetic field driven flow in a cylindrical container, *Proc. Joint 15<sup>th</sup> Riga and 16<sup>th</sup> PAMIR Conf. on Fundamental and Applied MHD. Riga, Latvia, June 27 – July 1, 2005*, pp. 133-136.
22. Gelfgat A. Yu. Destabilization of convection by weak rotation. Proc. 7<sup>th</sup> Int. Symp. on Stratified Flows, Rome, Italy, August 22-26, 2011.
23. Gelfgat A.Yu. and Molokov S. Quasi-two-dimensional convection in a 3D laterally heated box in a strong magnetic field normal to main circulation, Proc. 8<sup>th</sup> PAMIR International Conference on Fundamental and Applied MHD, Borgo, France, September 5-9, 2011.
24. Gelfgat A.Yu. Destabilization of free convection by weak rotation. Proc. 9<sup>th</sup> International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics. Malta, July 16-18, 2012.

### (III) Conference Abstracts

1. Vinokurov V., Gelfgat A.Yu., Ivanova G., Ljumkis E. and Martuzans B. 1985. Numerical modeling of heat transfer, flow, and shape of growing crystal during Czochralski growth of paratellurite (rus.), *Heat and Mass Transfer in Crystal Growth*, Abstracts of Lectures, Moscow, 57.
2. Gelfgat A.Yu. and Martuzans B. 1987. Suppression of thermogravitational convection in rectangular cavity by the magnetic field (rus.), *4th U.S.S.R. Seminar on Hydromechanics, Heat and Mass Transfer in Microgravity*, Abstracts of Lectures, Novosibirsk, 53.
3. Gelfgat A.Yu. 1987. Influence of the magnetic field on oscillatory instability of convective flows in rectangular cavity (rus.), *12th Riga MHD Seminar*, Abstracts of Lectures, Riga, 195-198.
4. Gelfgat A.Yu. and Martuzans B. 1989. Influence of the magnetic field on the oscillatory instability of convective flow of low Prandtl number fluid (rus.), *Yu.Gagarin Memorial Symp. on Aviation and Astronautics*, Abstracts of Lectures, Moscow, 268.
5. Gelfgat A.Yu. and Martuzans B. 1989. Oscillatory instability of the stationary regimes of thermogravitational-thermocapillary convection of low prandtl number fluid (rus.), *Numerical Methods for Modeling of Technological Processes*, Abstracts of Lectures, Riga, November 24-26, 46-47.
6. Gelfgat A.Yu. 1989. Evolution and instability of stationary thermogravitational convective flows under action of vertically directed vibration forces (rus.), *Numerical Methods for Modeling of Technological Processes*, Abstracts of Lectures, Riga, November 24-26, 48-49.
7. Gelfgat A.Yu. and Martuzans B. 1989. Stability of stationary convective flows in rectangular cavity, *Workshop on Nonlinear Problems in Theory of Hydrodynamics Stability*, Abstracts of Lectures, Moscow, 17.

8. Gelfgat A.Yu. 1990. Stabilization of stationary convective flows with the help of electromagnetic, vibration or thermocapillary forces (rus.). *13th Riga MHD Seminar*, Abstracts of Lectures, Riga, 111-112 .
9. Gelfgat A.Yu. and Martuzans B. 1991. Change in spatio-temporal structure of convective flow caused by electromagnetic, thermocapillary or vibration forces influence. *Int. Symp. on Generation of Large Scale Structures in Continuous Media*, Abstracts of Lectures, Perm-Moscow, June 11-20, 99-100.
10. Gelfgat A.Yu. 1991. Numerical realization of the spectral Galerkin method with small number of modes for computation of convective problems in regions of simple geometry, *Int. Symp. on Generation of Large Scale Structures in Continuous Media*, Abstracts of Lectures, Perm-Moscow, June 11-20, 97-98.
11. Gelfgat A.Yu. and Martuzans B. 1991. Stability of buoyancy stationary convective flows under action of electromagnetic, thermocapillary or vibration forces. *Proc. of the 1st Int. Symp. on Hydromechanics and Heat/Mass Transfer in Microgravity*. Perm-Moscow, 173-175.
12. Gelfgat A.Yu. and Martuzans B. 1991. Influence of electromagnetic, thermocapillary and vibrational forces on oscillatory instability of convective flows, *7th U.S.S.R. Symp. on Theoretical and Applied Mechanics*, Abstracts of Lectures, Moscow, August 15-21, 101.
13. Gelfgat A.Yu., Bar-Yoseph P., and Solan A. 1994. Stability of a confined swirling flow, *2nd European Fluid Mechanics Conference*, Warsaw, Poland, September 20-24.
14. Gelfgat A.Yu., Bar-Yoseph P. and Solan A. 1995. Steady-state and oscillatory instability of a confined swirling flow in a cylinder with rotating top and bottom, *Euromech Colloquium No.336 on Flows dominated by Centrifugal and Coriolis Forces*, Abstracts of Lectures, Trondheim, Norway, June 22-23.
15. Gelfgat A.Yu., Bar-Yoseph P. and Solan A. 1996. Numerical investigation of stability and slightly supercritical states of a confined swirling flow, *Abstracts of James H. Belfer Memorial Symposium "Nonlinear Mechanics"*, Haifa, Technion, 1996, 8-9.
16. Gelfgat A.Yu., Bar-Yoseph P. and Solan A. 1996. Numerical investigation of vortex breakdown and stability of a confined swirling flow, *Abstracts of XIXth Int. Congress of Theoretical and Applied Mechanics, Kyoto, Japan, August 25-31, 1996*, 179.
17. Gelfgat A.Yu., Bar-Yoseph P. and Yarin A. 1997. Multiple steady states and stability of convective flows in long horizontal cavities, *Abstracts of James H. Belfer memorial Symposium "Nonlinear Mechanics"*, Haifa, Technion, June 17, 1997, 4-5.
18. Gelfgat A.Yu., Bar-Yoseph P. and Solan A. 1998. Numerical study of stability, bifurcations and slightly supercritical states of confined flows using a global Galerkin method, *Abstracts of International Conference on Spectral and High Order Methods*, Herzliya, Israel, June 22-26, 1998.
19. Gelfgat A.Yu., Bar-Yoseph P. and Solan A. 1998. Study of stability, bifurcations and slightly supercritical states of confined flows using global Galerkin and finite volume methods. *Abstracts of ERCOFTAC/EUROMECH Colloquium 383 "Continuation Methods in Fluid Dynamics"*, Aussois, France, September 6-9, 1998, 7.
20. Gelfgat A.Yu., Bar-Yoseph P., Solan A. and Kowalewski T.A. 1999. High-azimuthal number axisymmetry-breaking convective instabilities in axisymmetric freezing of ice, *Abstracts of ESF-AMIF "Phase Change with Convection" Workshop*, Warsaw, Poland, June 24-26, 1999, 77-80.
21. Gelfgat A.Yu., Bar-Yoseph P., Solan A. and Kit E. 1999. Axisymmetry breaking instabilities of natural convection in a vertical bridgman growth configuration, *The 1999 Annual Conference of the Israeli Association for Crystal Growth*, Weizmann Institute of Science, Rehovot, November 16, 1999, 14.

22. Gelfgat A.Yu., Bar-Yoseph P. and Solan A. 2000. Numerical studies on axisymmetry – three dimensional transitions in rotating and convective flows, *Abstracts of James H. Belfer Memorial Symposium "Nonlinear Mechanics"*, Haifa, Technion, 2000, 14-15.
23. Gelfgat A.Yu., Bar-Yoseph P. and Solan A. 2000. Axisymmetry breaking of natural convection in a cylinder with parabolic sidewall temperature, *Abstracts of 20<sup>th</sup> International Congress of Theoretical and Applied Mechanics. Chicago 27 August – 2 September, 2000*, 81.
24. Gelfgat A.Yu., Bar-Yoseph P. and Solan A. 2000. Three-dimensional instability of flow in a rotating lid-cylinder enclosure, *Abstracts of 20<sup>th</sup> International Congress of Theoretical and Applied Mechanics. Chicago 27 August – 2 September, 2000*, 84.
25. Gelfgat A.Yu., Bar-Yoseph P. and Solan A. 2000. Axisymmetry-breaking instabilities in a vertical Bridgman crystal growth model, *Abstracts of Third Int. Workshop on Modeling in Crystal Growth, Hauppauge, New York, October 18-20, 2000*, 105.
26. Bar-Yoseph P., Gelfgat A.Yu., and Solan A. 2001. axisymmetric and three-dimensional instabilities of swirling flow in a cylinder with rotating lid, *Abstracts of 12<sup>th</sup> International Couette-Taylor Workshop. Evanston, IL, September 6-8, 2001*.
27. Gelfgat A.Yu., Yarin L., and Bar-Yoseph P. 2001. Stability of a two-layer Dean flow with a capillary liquid-liquid interface, *Abstracts of 12<sup>th</sup> International Couette-Taylor Workshop. Evanston, IL, September 6-8, 2001*.
28. Gelfgat A.Yu. and Bar-Yoseph P.Z. 2002. Multiple solutions and stability of confined convective and swirling flows, *Proc. 5<sup>th</sup> World Conference on Computational Mechanics, Vienna, July 7-12, 2002*.
29. Erenburg V., Gelfgat A.Yu., Kit E., Bar-Yoseph P.Z. and Solan A. 2002. Natural convection in a rectangular cavity with piece-wise heated vertical walls: multiple states, stability and bifurcations, *Proc. 8<sup>th</sup> International Heat Transfer Conference, Grenoble, August 8-23, 2002*.
30. Kit E., Gelfgat A.Yu., Nikitin N. 2003. Spatial evolution of forced disturbances in stratified mixing layer, *Geophys. Research Abstracts, Vol.5, 01496*.
31. Potapov A., Gelfgat A.Yu., and Bar-Yoseph P.Z. 2003. Computational modeling of melting/solidification affected by convection, *Abstracts of 29<sup>th</sup> Israel Mech. Eng. Conf., May 12-13, 2003, Haifa, Israel*.
32. Bar-Yoseph P.Z. and Gelfgat A.Yu. 2003. Bifurcation and stability analysis for crystal growth processes, *Abstracts of 29<sup>th</sup> Israel Mech. Eng. Conf., May 12-13, 2003, Haifa, Israel*.
33. Rubinov A., Gelfgat A.Yu., Bar-Yoseph P.Z., and Solan A. 2003. Parametric instability of cylindrical thermocapillary liquid bridges, *Abstracts of 29<sup>th</sup> Israel Mech. Eng. Conf., May 12-13, 2003, Haifa, Israel*.
34. Rubinov A., Bar-Yoseph P.Z., Solan A., Erenburg V., Gelfgat A.Yu., Kit E. 2003. Two- and three-dimensional instabilities of natural convection in a vertical cavity or cylinder with partially heated sidewalls, *The 5<sup>th</sup> European Fluid Mechanics Conference, August 24-28, Toulouse, France. Book of Abstracts, p. 111*.
35. Rubinov A., Bar-Yoseph P.Z., Solan A., Gelfgat A.Yu. 2003. Three-dimensional instability of thermocapillary convection in liquid bridges in zero gravity under different heating conditions, *The 5<sup>th</sup> European Fluid Mechanics Conference, August 24-28, Toulouse, France. Book of Abstracts, p. 497*.
36. Gelfgat A.Yu., Rubinov A., Bar-Yoseph P.Z., Solan A. 2004. Direct numerical study of three-dimensional instabilities in hydrodynamic model of Czochralski growth. *The 14<sup>th</sup> Int. Conf. on Crystal Growth, August 9-13, Grenoble, France. Book of Abstracts, p. 26*.
37. Gelfgat A.Yu. 2004. On some essential problems in numerical modeling of melt flow in bulk crystal growth, *The 23<sup>rd</sup> IVS Annual Conference and Workshop, September 27, 2004, Tel-Aviv, Book of Abstracts, p. CG-1*.

38. Gelfgat A.Yu. 2005. Treatment of pressure term in global Galerkin method with an arbitrary inner product for incompressible Navier-Stokes equations, *The 30<sup>th</sup> Israel Conference on Mechanical Engineering, May 29-30, Tel-Aviv, Israel*, pp. 98-99.
39. Gelfgat A. Yu. 2006. Spatial versus temporal instabilities in a parametrically forced stratified mixing layer, *EUROMECH Fluid Mechanics Conference 6. Stockholm, June 26-30, 2006*, Book of Abstracts, p. 254.
40. Gelfgat A.Yu., Bar-Yoseph P.Z., Cohen S. 2006. Magnetic field effects on stability of convective flows, *2<sup>nd</sup> International Symposium on Instabilities and Bifurcations in Fluid Dynamics, Lyngby, Denmark, August 15-18, 2006*. Book of Abstracts, p. 14-15.
41. Gelfgat A.Yu., E. Kit. 2006. Spatial versus temporal instabilities in a parametrically forced stratified mixing layer, *International Symposium on Instabilities and Bifurcations in Fluid Dynamics, Lyngby, Denmark, August 15-18, 2006*. Book of Abstracts, p. 34.
42. Gelfgat A.Yu. 2006. Solution of stability problems by a low-order finite volume method, *International Symposium on Instabilities and Bifurcations in Fluid Dynamics, Lyngby, Denmark, August 15-18, 2006*. Book of Abstracts, p. 50-51.
43. Gelfgat A.Yu. 2006. Three-dimensional stability calculations for hydrodynamic model of Czochralski growth. *5<sup>th</sup> International Workshop on Modeling in Crystal Growth, Bamberg, Germany, September 10-13, 2006*. Books of Abstracts, p. 55-56.
44. Gelfgat A.Yu., Kit E., Crnogorac N., Wilke H. 2007. A comparison exercise for computational modeling of instability and supercritical oscillatory states of melt flows in Czochralski growth of oxide crystals, *Abstracts of 15<sup>th</sup> Int. Conf. on Crystal Growth, Aug. 12-17, Salt Lake City, Utah, USA, abstract No. 523*.
45. Teitel M., Gelfgat A.Yu., Schwabe D. 2007. Experimental and computational study of flow instabilities in a model of Czochralski growth, *Abstracts of 15<sup>th</sup> Int. Conf. on Crystal Growth, Aug. 12-17, Salt Lake City, Utah, USA, abstract No. 524*.
46. Feldman Yu., Gelfgat A. Yu. 2008. An accelerated multigrid approach for time-integration of incompressible Navier-Stokes equations, *EUROMECH Fluid Mechanics Conference 7. Manchester, September 14-18, 2008*, Book of Abstracts, p. 98.
47. Vitoshkin H., Gelfgat A. Yu. 2008. Non-modal instability of mixing layer flow, *EUROMECH Fluid Mechanics Conference 7. Manchester, September 14-18, 2008*, Book of Abstracts, p. 358.
48. Feldman Yu., Gelfgat A., 2008. An accelerated semi-analytical coupled line Gauss-Seidel smoother (ASA-CLGS) for multigrid solution of incompressible Navier-Stokes equations, *9th European Multigrid Conference, Bad Herrenalb, Germany, October 2008*.
49. Vitoshkin H., Gelfgat A. Yu. 2009. Non-modal energy and enstrophy norm growth in the viscous mixing layer flow. *3<sup>rd</sup> Int. Symp. Bifurcations and Instabilities in Fluid Dynamics, Nottingham, UK, August 2009*. Book of Abstracts, pp. 65-66.
50. Feldman Yu., Tuckerman L., Gelfgat A. Time-marching-based CFD for modeling instabilities and bifurcations of 3D flows: full pressure-velocity coupled multigrid approach. *3<sup>rd</sup> Int. Symp. Bifurcations and Instabilities in Fluid Dynamics, Nottingham, UK, August 2009*. Book of Abstracts, p. 69.
51. Haslavsky V., Miroshnichenko E., Kit E., Gelfgat A.Yu. 2010. On experimental and numerical prediction of instabilities in Czochralski melt flow configuration. *EUROMECH Fluid Mechanics Conference 7. Bad Reichenhall, Germany, September 13-16, 2010*. Book of abstracts, S1-34.
52. Vitoshkin H., Gelfgat A.Yu. 2010. Transient growth in a viscous mixing layer flow. *EUROMECH Fluid Mechanics Conference 7. Bad Reichenhall, Germany, September 13-16, 2010*. Book of abstracts, S1-41.

53. Vitoshkin H., Heifetz E., Gelfgat A. Yu. 2011. On the generic role of vorticity stretching in three-dimensional transient growth of plane parallel shear flows. *4<sup>th</sup> Int. Symp. Bifurcations and Instabilities in Fluid Mechanics*, Barcelona, Spain, July 18-21, 2011.
54. Feldman Y., Gelfgat A. Yu. 2011. Numerical and experimental study of transitions and slightly supercritical regimes in confined three-dimensional recirculating flows. *4<sup>th</sup> Int. Symp. Bifurcations and Instabilities in Fluid Mechanics*, Barcelona, Spain, July 18-21, 2011.
55. Haslavski V., Miroshnichenko E., Kit E., Gelfgat A. Yu. 2011. Experimental prediction of instabilities in Czochralski melt flow configuration. *4<sup>th</sup> Int. Symp. Bifurcations and Instabilities in Fluid Mechanics*, Barcelona, Spain, July 18-21, 2011.
56. Gelfgat A. Yu. 2011. Destabilization of convection by weak rotation. *7<sup>th</sup> Int. Symp. on Stratified Flows*, Rome, Italy, August 22-26, 2011.
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, *8<sup>th</sup> PAMIR International Conference on Fundamental and Applied MHD*, Borgo, France, September 5-9, 2011.
58. Gelfgat A. Yu. 2012. Destabilization of convection by weak rotation. *9<sup>th</sup> Int. Conf. on Heat Transfer, Fluid Mechanics and Thermodynamics*, Malta, July 16-18, 2012.
59. Vitoshkin H., Gelfgat A. Yu. 2012. Three-dimensional non-modal instabilities of a viscous mixing layer flow. *EUROMECH Fluid Mechanics Conference*, Rome, September 9-13, 2012.
60. Haslavski V., Miroshnichenko E., Kit E., Gelfgat A. Yu. 2012. Synergy of experimental technologies for prediction of instabilities in Czochralski crystal growth configuration. *9<sup>th</sup> EUROMECH Fluid Mechanics Conference*, Rome, September 9-13, 2012.
61. Heifetz E., Vitoshkin H., Gelfgat A. Yu., Harnik N.. 2012. On the role of vortex stretching in energy optimal growth of three dimensional perturbations on plane parallel shear flows. *9<sup>th</sup> EUROMECH Fluid Mechanics Conference*, Rome, September 9-13, 2012.
62. Gelfgat A. Yu. 2012. Destabilization of convection by weak rotation. *5<sup>th</sup> Symposium of Global Flow Instability and Control*, Hersonissos, Crete, September 19-22, 2012.
63. Vitoshkin H., Gelfgat A. Yu. 2012. Three-dimensional non-modal instabilities of a viscous mixing layer flow. *The 32<sup>nd</sup> Israeli Conference on Mechanical Engineering*, Tel-Aviv, October 17-18, 2012.
64. Haslavski V., Miroshnichenko E., Kit E., Gelfgat A. Yu. 2012. Synergy of experimental technologies for prediction of instabilities in Czochralski crystal growth configuration. *The 32<sup>nd</sup> Israeli Conference on Mechanical Engineering*, Tel-Aviv, October 17-18, 2012.

#### (IV) Refereed papers in Transactions of Institutions

1. Gelfgat A. Yu. and Pavlov S. I. 1982. Analytical calculation of the electromagnetic field and flow of melt in the zone of contact of inductive furnace with cold crucible (rus.), *Electrodynamics and Mechanics of Continuous Media*, University of Latvia, 20-29.
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** 29<sup>th</sup> Israel Mechanical Engineering Conference. Member of Program Committee.
- 2003** 15<sup>th</sup> 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** 20<sup>th</sup> 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** 24<sup>th</sup> 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** 7<sup>th</sup> World Conference on Experimental Heat Transfer, Fluid Mechanics and Thermodynamics. Member of Scientific Committee.
- 2009** 3<sup>rd</sup> International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Member of Organizing Committee.
- 2011** 30<sup>th</sup> IACMM Congress on Computational Mechanics. Member of Organizing Committee.
- 2011** 4<sup>th</sup> International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Member of Organizing Committee.
- 2012** 6<sup>th</sup> Conference of the International Marangoni Association "Interfacial Phenomena in Fluid Mechanics". Member of Organizing Committee.
- 2013** 8<sup>th</sup> World Conference on Experimental Heat Transfer, Fluid Mechanics and Thermodynamics. Member of Scientific Committee.
- 2013** 5<sup>th</sup> International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Member of Organizing Committee.

**2014** 7<sup>th</sup> Conference of the International Marangoni Association “Interfacial Phenomena in Fluid Mechanics”. Member of Scientific 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”, 8<sup>th</sup> International Symposium on Computational Fluid Dynamics, Bremen, September 5-10, 1999.
- 2000** Chairman. Session “Application of Vortical Flows”, 11<sup>th</sup> 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, 15<sup>th</sup> Meeting of Israel Association for Computational Mechanics, Tel-Aviv University, October 2003.
- 2006** Chairman, Bioengineering Session, 20<sup>th</sup> IACMM Congress on Computational Mechanics.  
Chairman, Natural Convection Session, 2<sup>nd</sup> International Symposium on Instabilities and Bifurcations in Fluid Dynamics, Lyngby, Denmark, August 15-28, 2006.
- 2008** Chairman, Afternoon Session, 24<sup>th</sup> 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, 3<sup>rd</sup> International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Nottingham, UK, August 10-14, 2009.
- 2011** Chairman, Afternoon Session, 30<sup>th</sup> Meeting of Israel Association for Computational Mechanics, Tel-Aviv University, March 2011.
- 2011** Chairman, sessions “Multiphase flows” and “Bifurcations and Instabilities in Technological Applications”, 4<sup>th</sup> International Symposium "Bifurcations and Instabilities in Fluid Dynamics". Barcelona, Spain, July 18-21, 2011.

- 2012** Chairman, session “Fluid flow and Visualization”, 9<sup>th</sup> International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics. Malta, July 16-18, 2012.
- 2012** Chairman, session “Global Instability Analysis”, 5<sup>th</sup> Symposium of Global Flow Instability and Control, Hersonissos, Crete, September 19-22, 2012.
65. **2012** Chairman, session “Hydrodynamic Instabilities”, *The 32<sup>nd</sup> Israeli Conference on Mechanical Engineering*, Tel-Aviv, October 17-18, 2012.