CURRICULUM VITAE

Personal Data

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Academic Degrees

1972,	B.Sc. (cum laude), Aeronautical Engineering, Technion-Israel Institute of Technology, Haifa, Israel;
1980,	D.Sc. Applied Mathematics, Technion-Israel Institute of Technology, Haifa, Israel.

Academic Appointments

Present:	
2020 -	Professor Emeritus, Computer Science Dept., Technion, Haifa, Israel.
(1997-2019	Full Professor, Computer Science Dept., Technion, and The George Farkas Chair in Computer Science)
Previous:	
1973	Adjunct Instructor, Mathematics Dept., Technion, Haifa, Israel;
1981 (spring)	Adjunct Lecturer, Mathematics Dept., Tel Aviv University, Tel Aviv, Israel;
1981-1982	Instructor, Applied Mathematics, Massachusetts Institute of Technology, Cambridge, MA, USA;
1982-1983	Lecturer, Applied Mathematics, Massachusetts Institute of Technology, Cambridge, MA, USA;
1984-1985	Adjunct Lecturer, Mathematics Dept., Technion, Haifa, Israel;
1985-1986	Adjunct Senior Lecturer, Computer Science Dept., Technion, Haifa, Israel;
1986-1989	Senior Lecturer, Computer Science Dept., Technion, Haifa, Israel;
1989-1990	Visiting Professor, Computer Science Dept., University Witwatersrand, Johannesburg, South Africa.
1989-1997	Associate Professor, Computer Science Dept., Technion, Haifa, Israel.
April 1997	Visiting Professor, Technical University Vienna, Austria.
1996-1997	EPSRC Visiting Fellow, Dept. Applied Mathematics and Theoretical Physics, University of Cambridge, UK.
2000-2001	Visiting Professor, Department of Hydraulics and Mechanics,

	Institut National Polytechnique de Grenoble, France.
2008-2009	Visiting Professor, Computational Multiphysics Group, Dept of Mech. & Aerospace Eng., University of Florida, Gainesville, Fl, USA.
2012-2013	Visiting Professor, Institute of Applied Mechanics, National Taiwan Un., Taipei, Taiwan.
2013 June-Sept.	Visiting Fellow, Applied Mathematics, School of Mathematics, University of Bristol, UK.
2017 July-Aug.	Benjamin Meaker Visiting Professor, Inst. Advanced Studies, University of Bristol, UK.
2018 July-Aug.	Visiting Research Scholar, Mech. and Aero. Engineering, Princeton University, USA.
2019 July-Aug.	Visiting Research Scholar, Mech. and Aero. Engineering, Princeton University, USA.

Teaching Experience

1973 - Recitations in Calculus, Technion, Haifa, Israel.

Fall 1981 and Spring 1982 - Recitations in Complex Variables with Applications, M.I.T., Cambridge, MA, USA.

Spring 1982 and Spring 1983 - Lectures in Fluid Dynamics for graduate students (course #18.355) M.I.T., Cambridge, MA, USA.

1984-1985 - Lectures in Fluid Dynamics (mainly Two-Phase and Rotating Flows), Mathematics Dept., (course #198006), Technion, Haifa, Israel.

Fall 1985-present - Lectures in Numerical Analysis, (course #234107), Computer Science Dept., Technion, Haifa, Israel.

1986- 2004 - Lectures in Numerical Solution of Partial Differential Equations, (course #236336), Computer Science Dept., Technion, Haifa, Israel.

Fall 1988, 1991, 1993, present - Lectures in Principles of Parallelism in Scientific Programming (Advanced Topics in Computer Science, course #236605 and #236275), Computer Science Dept., Technion, Haifa, Israel.

1990 - 1995 - Lectures in Introduction to Computer with Fortran (course #234109), Computer Science Dept., Technion, Haifa, Israel.

Fall 1993 - present - Lectures in Hydrodynamics of Suspensions (course #108914), Applied Mathematics, Technion, Haifa, Israel.

2005 - present - Lectures in Mathematical Methods for Computer Science, Computer Science Dept., Technion.

1985 - present - Lectures and Seminars on Advanced topics in Modeling and Simulation of Complex Flow Fields. (Technion; Technical University Vienna; Institut National Polytechnique de Grenoble.)

Professional and Research Experience and Appointments

Aug. 1972-Oct. 1986 - Research Engineer, Computer Science Dept., G.O.I. (On leave during Sept. 1981-Sept. 1983, see below.) Since June 1984, rank A (equivalent to Associate Professor).

Performed, initiated and supervised various R&D tasks in the domain of aeronautics, computer simulation of flight systems, computational fluid dynamics, asymptotical investigation of fluid flows.

Particular Assignments:

1978-1981 - Head of Computational Fluid Dynamics Group. Initiated and supervised the work of five people (applied mathematicians and computer programmers) on numerical and asymptotic solutions of various problems of practical and academic interest.

Oct. 1983-Oct. 1986 - Head of Applied Mathematics Division. Coordinated, initiated and supervised the work of about 20 professional workers (many of them Ph.D.s) in the areas of computer application to optimization, fluid dynamics, signal processing and numerical analysis.

1985-1989 - Consultant, Applied Mathematics, Massachusetts Institute of Technology. Collaborated on Rotating Flow research projects with emphasis on computational aspects, partly during regular summer visits.

Membership in Editorial Boards

2011- Editorial Board of the Journal *Environmental Fluid Mechanics.*

Membership in Technion Committees

1987-1988, Member of the Committee on Supercomputer.
1988-1992, Member of the Interdisciplinary Committee on Graduate Studies in Applied Mathematics. 1994-1996, Member of the Steering Committee on the Computer Center.
1994-1996, Member of the Referees Committee on the Joint Research Fund of the Technion and Haifa University.
1998-2000, Member of the Development and Steering Committee on Computing and Communication.
2003-2005, Member of the Academic Development Committee.
2003-2005, Comptroller of the Technion Faculty Association.
2005-present, Elected Member of the Technion Senate.
2009-present, Member of the Interdisciplinary Committee on Graduate Studies in Applied Mathematics. 2009-present, Elected Member of the Israeli Inter-Senate Committee for University Academic Freedom.

Advanced Studies Abroad

1981-1983 - At M.I.T., Applied Mathematics, performed post-doctoral research on Rotating and Two-Phase flows, in collaboration with Prof. H.P. Greenspan.

Active Participation in International Congresses

1. 7-th International Conference on Numerical Methods in Fluid Dynamics, Stanford University, USA, June 1980. Paper presented:
   Improvement of Numerical Schemes by Incorporation of Approximate Solutions Applied to Rotating Compressible Flows (in collaboration with M. Israeli).

2. International Conference on Physico-Chemical Flows, Tel Aviv, Israel, December 1984. Paper presented:
   Aspects of Rotating Two-Phase Flows (in collaboration with H.P. Greenspan).

3. First Meeting on Separation Phenomena in Liquids and Gases, Darmstadt, W. Germany, July 1987. Paper presented:
   Two-Phase Theory of Centrifugal Separation of Suspensions (in collaboration with H.P. Greenspan).

4. Second Meeting on Separation Phenomena in Liquids and Gases, Versailles, France, July 1989. Papers presented:
   Modeling, Simulation and Comprehension of Separating Particle-Fluid Flows. (Invited.)
   Spin-Up from Rest of a Suspension - A Preliminary Insight.

5. Second World Congress on Computational Mechanics, Stuttgart, West Germany, August 1990. Paper presented:
   Modeling and Simulation of Separating Mixture Flow.

6. Third International Workshop on Separation Phenomena in Liquids and Gases, Charlottesville, VA, USA, August 1992. Paper presented:
   On Recent Developments in the Theory of Centrifugal Separation of Suspensions. (Invited.)
   Chairman of session on Centrifugation.

7. EUROMECH 300: Interaction Between Vorticity Fields and Boundaries, Istanbul, Turkey, September 1993. Papers presented:
   On a Slowly Rising Disk in a Rotating Fluid for Arbitrary Taylor Number (in collaboration with D. Vedensky).
   The Motion of a Rising Disk in a Rotating Axially Bounded Fluid for Large Taylor Number (in collaboration with D. Vedensky).

8. APS 46th Annual Meeting of the Division of Fluid Dynamics, Albuquerque, USA, November 1993. Papers presented:
   The Motion Generated by a Slowly Rising Disk in a Rotating Fluid (in collaboration with D. Vedensky).
   Rotating Flows of Separating Polydispersed Suspensions.

9. GAMM 94 meeting, Braunschweig, Germany, April 1994. Paper presented:
   Rotating Flows of Separating Polydispersed Suspensions.

10. APS 47th Annual Meeting of the Division of Fluid Dynamics, Atlanta, USA, November 1994. Paper presented:
    A Quasi-Geostrophic Approximation for the Drag on a Rising Particle in a Rotating Fluid.

11. EUROMECH 336: Flows Dominated by Centrifugal and Coriolis Forces, Trondheim, Norway, June 1995. Paper presented:

Recent Developments in the Analysis of Centrifugal Separations and Unfolding Challenges in the Classic Theory of Rotating Fluids.

12. APS 48th Annual Meeting of the Division of Fluid Dynamics, Irvine, USA, November 1995. Paper presented:
Spin-up effects in the Geostrophic and Quasi-Geostrophic Drag on a Rising Particle in a Rotating Fluid.

13. APS 49th Annual Meeting of the Division of Fluid Dynamics, Syracuse, USA, November 1996. Papers presented:
Particle-driven Gravity Currents in Rotating Systems (in collaboration with H. E. Huppert).
Numerical Computation of the Flow around a Moving Particle In a Bounded Rotating Fluid (in collaboration with E. Minkov).

14. 1997 International Mechanical Engineering Congress (ASME), Dallas, USA, November 1997. Papers presented:
Modeling and Simulation of Rotating Buoyant Suspensions - Fundamentals and Challenges, Keynote lecture in Symposium on rotating and buoyancy-driven flows.
Particle Entrainment in a Bounded Rotating Flow with a Drain in collaboration with J. Mang, E. Minkov, and U. Schaflinger.

15. 22nd International Conference on Mathematical Geophysics, Cambridge, UK, July 1998. Papers presented:
A Box Model and Similarity Correlations of Coriolis-influenced Axisymmetric Particle-driven Gravity Currents in collaboration with H. E. Huppert.
Critical Axisymmetric Source-sink Flow of a Separating Suspension in a Gravitational-centrifugal-Coriolis Force Field in collaboration with J. Mang and U. Schaflinger.
Numerical Investigation of the Axial Translation of a Particle in a Rotating Flow in collaboration with E. Minkov (poster presentation).

16. APS 51th Annual Meeting of the Division of Fluid Dynamics, Philadelphia, USA, November 1998. Papers presented:
Numerical Solution of Axisymmetric Gravity Currents in a Rotating System
Centrifugal-gravity Separation of a Suspension during Withdrawal from a Rotating Tank in collaboration with J. Mang and U. Schaflinger.

17. EUROMECH 396: Vortical Structures In Rotating and Stratified Fluids. Cortona, Italy, June 1999. Paper presented:
Axisymmetric Gravity Currents in a Rotating System - some novel insights provided by numerical solutions.

18. ERCOFTAC 1999 Annual Meeting of the L. Euler Swiss Center of European Res. Community on Flow, Turbulence and Combustion, topic "Multiphase Flow," Zurich, Switzerland, November 1999. Paper presented:
On Axisymmetric Gravity Currents: results and open questions for the rotating and/or particle-driven cases. (Invited.)

19. USER MEETING of CORIOLIS FACILITY, Grenoble, France, March 3-4th 2000. Paper presented:
Rotation effects on axisymmetric gravity currents in collaboration with H.E. Huppert and M.A. Hallworth.

20. Fundamentals of Fluid Flow meeting 2001 (FFF2001), BP Institute, Cambridge, UK, December 11-13 2001. Paper presented:
Spin-up from rest of multi-layer and stratified fluids about a vertical axis (invited.)

21. Sedimentation and Sediment Transport Symposium, Monte Verita, Switzerland, September 1-6 2002. Paper presented:
Centrifugal sedimentation processes in suspensions - fundamentals and challenges of efficient simulation.

22. HYDRALAB II and User Meeting, Budapest, Hungary, May 21-24, 2003. Paper presented:
The effect of rotation on axisymmetric gravity currents in a stratified ambient in collaboration with H.E. Huppert, M.A. Hallworth, and T. Zemach.

23. ICTAM04 - XXI International Congress of Theoretical and Applied Mechanics, Warsaw, Poland, August 15-21, 2004. Papers presented:
Intrusive gravity currents in a stratified ambient - novel theoretical results and insights
Segregation of suspended particles in a rotating fluid-filled horizontal cylinder - experiment and theory, in collaboration with G. Seiden, S. Lipson and J. Franklin.

24. Dynamic Planet 2005, Cairns, Australia, August 22-26, 2005. Papers presented:
Intrusions into a stratified ambient: effects of asymmetry, in collaboration with H.E. Huppert, M.A. Hallworth, and T. Zemach;
Axisymmetric intrusive gravity currents in a stratified ambient -similarity and initial-value theoretical results in collaboration with T. Zemach.

25. APS 58th Annual Meeting of the Division of Fluid Dynamics, Chicago, USA, November 2005. Paper presented:
Steady-state propagation of gravity currents into a linearly stratified ambient: a generalization of Benjamin's results.

26. STAMM2006 Vienna, Austria, July 2006. Paper presented:
Steady-state propagation of gravity currents in linearly stratified ambient: a generalization of Benjamin's results.

27. APS 59th Annual Meeting of the Division of Fluid Dynamics, Tampa, USA, November 2006. Paper presented:
Energy dissipation in shallow-water models for high-Re gravity currents

28. IUTAM Symposium on Recent Advances in Multiphase Flows: Numerical and experimental, Istanbul, Turkey, June 2007. Paper presented:
The role of inertial waves in the pattern formation of a suspension in a cylinder rotating about a horizontal axis at small Ekman and Rossby numbers (invited) in collaboration with G. Seiden and G. Lipson.

29. Plumes and Gravity Currents in Stratified Environments workshop, Edmonton, Canada, October 2007. Paper presented:
Theoretical investigations of gravity currents and intrusions in linearly stratified ambients, (invited).

30. APS 61th Annual Meeting of the Division of Fluid Dynamics, San Antonio, USA, November 2008. Paper presented:
Intrusions with variable inflow in a linearly stratified ambient . Also, chaired the session *Rotating Flows.*

31. 2009 ASME Fluid Engineering Division Meeting (FEDSM2009), Vail, USA, August 2009. Papers presented:
Theoretical investigations of gravity currents and intrusions propagating in continuously stratified ambient
A numerical investigation of gravity currents with variable inflow in collaboration with S. Balachandar, M. Shringarpure and H. Lee. Also, chaired sessions I and VI of the *Forum on Multiphase Processes in Geophysical & Environmental Flows.*

32. APS 62th Annual Meeting of the Division of Fluid Dynamics, Minneapolis, USA, November 2009. Paper presented:
Non-Boussinesq axisymmetric gravity currents at high Re

33. APS 63th Annual Meeting of the Division of Fluid Dynamics, Long Beach, USA, November 2010. Papers presented:
The dam-break of non-Boussinesq gravity currents of various fractional depth: two-layer shallow-water results
Initial lock ratio effects on the dynamics of constant-volume density currents in collaboration with T. Bonometti and S. Balachandar.

34. APS 64th Annual Meeting of the Division of Fluid Dynamics, Baltimore, USA, November 2011. Paper presented:
Shallow-water models for gravity currents and intrusions in double-continuous-stratification systems.

35. Workshop on Environmental and Extreme Multiphase Flows, Gainesville, Fl., USA, March 2012. Papers presented:
M. Ungarish, *Gravity currents in non-rectangular channels and in bi-stratified systems.*
T. Bonometti, S. Balachandar and M. Ungarish, *A numerical investigation of the release of cylindrical non-Boussinesq gravity currents in non-rotating and rotating systems.*
Chairman of session.

36. APS 66th Annual Meeting of the Division of Fluid Dynamics, Pittsburgh, USA, November 2013. Paper presented:
A generalized shallow-water analysis of gravity currents in various cross-area channels for Boussinesq and non-Boussinesq systems.

37. GKB Lab 50th anniversary/Herbert Huppert's 70th birthday symposiums, DAMTP Cambridge UK, April 2014. Paper presented:
Effects of cross-section shape on the propagation of gravity currents in channels.

38. APS 67th Annual Meeting of the Division of Fluid Dynamics, San Francisco, USA, November 2014. Paper presented:
Shallow-water solutions for gravity currents in non-rectangular cross-area channels with stratified ambient

39. APS 68th Annual Meeting of the Division of Fluid Dynamics, Boston, USA, November 2015. Paper presented:
Front conditions for gravity currents in channels of general cross-section: some general conclusions

40. APS 70th Annual Meeting of the Division of Fluid Dynamics, Denver, CO. USA, November 2017. Paper presented:
Gravity currents into an ambient with an open surface.
Also, chaired the session *Geophysical Fluid Dynamics: General*

41. APS 71th Annual Meeting of the Division of Fluid Dynamics, Atlanta, GA. USA, November 2018. Paper presented:
Gravity current in a channel of general cross-section with open top surface

42. EUROMECH Colloquium 608: Dynamics of Gravity Currents, 28-30/06/2023, LEGI, University of Grenoble Alpes, Grenoble, France. Papers presented/contributed:
The theory of gravity currents and intrusions — a brief review of progress and challenges
Rotating gravity currents at moderate Rossby numbers in collaboration with T. Bonometti, J. Salinas and M. Cantero.

43. Dispersed Two-Phase Flows (5th edition) 8-10/07/2024, ENSEM - Vandoeuvre-les-Nancy, France. Paper presented:
The Taylor column and drag force on a rising particle in a rotating fluid

44. Particulate Gravity Currents 24, 9-11/09/2024, Hull, UK. Paper presented: *Modelling and interpretation of the "slumping phase" of down-slope propagation of a lock-release particle-driven gravity current*, (invited).

45. APS 78th Annual Meeting of the Division of Fluid Dynamics, Houston, TX. USA, November 2025. Paper presented:
Improved box models for Newtonian and power-law viscous gravity currents

Organization of Congress

GAMM meeting, minisymposium on multiphase flow, Braunschweig, Germany, April 1994 (in collaboration with U. Schaflinger).

Seminars

Several at M.I.T. (Depts. of Mathematics, Chemical Engineering and Aeronautics); Tel Aviv University (Dept. of Mathematics); Institute for Computer Application in Science and Engineering (ICASE - Hampton, VA, USA); Levich Institute, New York; annual meetings of the Israeli Society for the Application of Mathematics; Technion; Royal Inst. of Technology, Stockholm; Technical University of Vienna; University of Eindhoven; Harvard University; Cambridge University; Oxford University; Technical University of Graz; LEGI-Grenoble; University College-London; Ecole Normale Superieure-Paris; University of Alberta Edmonton; Stanford University; UC Santa Barbara; Woods Hole Institute; UF Gainesville; USF College of Marine Science St. Petersburg; University of Toulouse; Tokyo University; Kobe University; University of Roma, University of Bologna, National Taiwan University, Taipei; Hong-Kong University; NCAR Boulder CO.

Awards and Fellowships

1980 - M. Landau Award of Mifal Hapais, Israel, for prominent doctoral research.

Academic Year 1981-1982 - Rothschild Fellowship, for post-doctoral research at M.I.T., Cambridge, MA, USA.

Academic Year 1982-1983 - Bantrell Fellowship, for post-doctoral research at M.I.T., Cambridge, MA, USA.

1991 - Taub Award in Computer Science, Technion, Israel.

1993 - Prominent Faculty Lecturer, title awarded for teaching performances in the course on Principles of Parallelism in Scientific Programming.

Academic Year 1996-1997 - Engineering and Physical Sciences Research Council (EPSRC, United Kingdom) Fellowship, for research at University of Cambridge.

2003 - Awarded The George Farkas Chair in Computer Science.

Fields of Research and Work

Two-Phase Flows, Rotating Fluids (incompressible, compressible, two-phase and liquid metals), Computational Fluid Dynamics, Implementation of Parallel Computers, Numerical Methods, Asymptotic Methods in Fluid Dynamics, Simulation of Flight Systems. Strong background in scientific programming and development of large numerical codes, including implementation on vector supercomputers. Major problems of current interest: (a) the implementation of parallel computing in the solution of partial differential equations and fluid dynamics problems; (b) the numerical (finite differences) solution of two-phase flow in a rotating cylinder; (c) a comprehensive review of the theory and simulation of centrifugally separating mixtures; (d) modeling and solution of spin-up effects in suspensions, liquid metal and gravity currents; (e) modeling and investigation of Coriolis effects in polydispersions; (f) "exact" calculation of the flow and forces on a particle in a rotating fluid, in particular at Taylor number of order unity; (g) simulation of rotating flow field around particles at practical ranges of parameters for closing the gap between theory and experiments; (h) stability "micro" and "macro" mechanism in layered suspensions; (i) swirling flow of liquid metals; (j) gravity currents in rotating systems - box-models, asymptotical, shallow-water and finite-difference solution, and related experiments; (k) gravity currents over a porous boundary; (l) spin-up from rest of multi-layered and stratified fluids; (m) gravity currents and intrusions in stratified ambient; (n) pattern formation in rotating suspensions; (o) non-Boussinesq gravity currents; (p) gravity currents in non-rectangular channels.

LIST OF SCIENTIFIC AND PROFESSIONAL PUBLICATIONS

a) Thesis:

Combination of Asymptotic and Numerical Methods for the Investigation of Rotating Compressible Flows in a Cylinder for small Rossby and Ekman Numbers, D.Sc. thesis, Technion, Haifa, April 1980 (in Hebrew). Supervisor: Prof. M. Israeli.

b) Original Papers in Professional Journals, with Referees:

1) Published

1. M. Toren, A. Solan, M. Ungarish, "Rotating Flow over a Disk Sector" *J. Appl. Mech.,* Vol. 49, #1, pp.13-18, 1982.

2. M. Ungarish, M. Toren, A. Solan, "The Flow over a Rotating Disk Sector" *J. Appl. Mech.,* Vol. 49, #3, pp. 661-663, 1982.

3. M. Israeli, M. Ungarish, "Improvement of Numerical Solution of Boundary Layer Problems by Incorporation of Asymptotic Approximations" *Num. Math.,* Vol. 39, pp. 309-324, 1982.

4. H.P. Greenspan, M. Ungarish, "On Hindered Settling of Particles of Different Sizes," *Int. J. Multiphase Flow,* Vol. 8, #6, pp. 587-604, 1982.

5. M. Israeli, M. Ungarish, "Laminar Compressible Flow Between Close Rotating Disks - An Asymptotic and Numerical Study," *Computers and Fluids,* Vol. 11, #2, pp. 145-157, 1983.

6. M. Ungarish, H.P. Greenspan, "On Two-Phase Flow in a Rotating Boundary Layer," *Studies in Appl. Math.,* Vol. 69, pp. 145-175, 1983.

7. M. Ungarish, H.P. Greenspan, "On Centrifugal Separation of Particles of Two Different Sizes," *Int. J. Multiphase Flow,* Vol. 10, #2, pp. 133-148, 1984.

8. M. Ungarish, H.P. Greenspan, "On the Radial Filling of a Rotating Cylinder," *J. Fluid Mech.,* Vol. 141, pp. 97-107, 1984.

9. M. Ungarish, M. Israeli, "Axisymmetric Compressible Flow in a Rotating Cylinder with Axial Convection," *J. Fluid Mech.,* Vol. 154, pp. 121-144, 1985.

10. H.P. Greenspan, M. Ungarish, "On the Centrifugal Separation of a Bulk Mixture," *Int. J. Multiphase Flow,* Vol. 11, #6, pp. 825-835, 1985.

11. H.P. Greenspan, M. Ungarish, "On the Enhancement of Centrifugal Separation," *J. Fluid Mech.,* Vol. 157, pp. 359-379, 1985.

12. M. Ungarish, "Flow of a Separating Mixture in a Rotating Cylinder," *Phys. Fluids,* Vol. 29, #3, pp. 640-646, 1986.

13. M. Ungarish, H.P. Greenspan, "On the Radial Filling of a Rotating Cylinder with a Mixture," *J. Fluid Mech.,* Vol. 162, pp. 117-128, 1986.

14. M. Ungarish, "Two-Fluid Analysis of Centrifugal Separation in a Finite Cylinder," *Int. J. Multiphase Flow,* Vol. 14, #2, pp. 233-243, 1988.

15. M. Ungarish, "On Shear Layers in Mixture Separation in Rotating Containers with Inclined Walls," *J. Fluid Mech.,* Vol. 193, pp. 27-51, 1988.

16. M. Ungarish, "Numerical Investigation of Two-Phase Rotating Flow," *Int. J. Multiphase Flow,* Vol. 14, #6, pp. 729-747, 1988.

17. M. Ungarish, "Side Wall Effects in Centrifugal Separation of Mixtures," *Phys. Fluids A,* Vol. 1, #5, pp. 810-818, 1989.

18. M. Ungarish, "Spin-up from Rest of a Mixture," *Phys. Fluids A,* Vol. 2, #2, pp. 160-166, 1990.

19. C. Daitzchman, C. Aharoni, and M. Ungarish, "Effects of Subsurface Penetration on the Kinetics of Adsorption," *Surface Science,* Vol. 244, pp. 362-370, 1991.

20. M. Ungarish, "On Spin-up from Rest of a Light-Particle Suspension in a Cylinder: Theory and Observations," *Int. J. Multiphase Flow,* Vol. 17, #1, pp. 131-143, 1991.

21. M. Toren, M. Ungarish, A. Solan, and G. Pinchuck, "Buoyancy Driven Convection due to Mass Transfer Near a Rotating Disk at High Schmidt Numbers," *J. Appl. Mech.,* Vol. 113, pp. 566-571, 1991.

22. M. Ungarish, "Modeling and Simulation of Separating Mixture Flows," *Computer Meth. Appl. Mech. and Eng.,* 91, pp. 1175-1185, 1991.

23. G. Amberg, M. Ungarish, "Spin-up from Rest of a Mixture: Simulation and Theory." *J. Fluid Mech.,* Vol. 246, pp. 443-464, 1993.

24. D. Vedensky, M. Ungarish, "The Motion Generated by a Slowly Rising Disk in an Unbounded Rotating Fluid for Arbitrary Taylor Number," *J. Fluid Mech.,* Vol. 262, pp. 1-26, 1994.

25. M. Ungarish, "Centrifugal Separation of a Polydispersed Suspension in a Long Cylinder," *ZAMM,* Vol. 75, pp. 23-26, 1995.

26. M. Ungarish, D. Vedensky, "The Motion of a Rising Disk in a Rotating Axially Bounded Fluid for Large Taylor Number," *J. Fluid Mech.,* Vol. 291, pp. 1-32, 1995.

27. M. Ungarish, "On the Modeling and Investigation of Polydispersed Rotating Suspensions," *Int. J. Multiphase Flow,* Vol. 21, # 2, pp. 262-284, 1995.

28. M. Ungarish, "A Note on the Effects of Bulk Density vs. Interstitial Fluid Density in Stability Considerations of a Suspension Overlain by a Heavy Fluid," *Int. J. Multiphase Flow*, Vol. 22, pp. 621-625, 1996.

29. M. Ungarish, "Some Shear-Layer and Inertial Modifications of the Geostrophic Drag on a Slowly Rising Particle or Drop in a Rotating Fluid," *J. Fluid Mech.,* Vol. 319, pp. 219-249, 1996.

30. M. Ungarish, "Some Shear-Layer and Spin-Up Modifications of the Geostrophic Drag on a Slowly Rising Particle or Drop in a Rotating Fluid," *Phys. Fluids*, Vol. 9, pp. 325-336, 1997.

31. M. Ungarish, "The Spin-up of Liquid Metal Driven by a Rotating Magnetic Field," *J. Fluid Mech.*, Vol. 347, pp. 105-116, 1997.

32. M. Ungarish, H.E. Huppert "The effects of rotation on axisymmetric particle-driven gravity currents," *J. Fluid Mech.*, Vol. 362, pp. 17-51, 1998.

33. M. Ungarish, H.E. Huppert "Simple models of Coriolis-influenced axisymmetric particle-driven gravity currents," *Int. J. Multiphase Flow*, Vol. 25, pp 715-737, 1999.

34. A.J. Hogg, M. Ungarish, H.E. Huppert "Particle-driven gravity currents: asymptotic and box-model solutions," *European J. Mech. B / Fluids*, Vol. 19, pp. 139-165, 2000.

35. J. Mang, M. Ungarish, U. Schaflinger, "Numerical separation of a mixture in a rotating source-sink flow," *ZAMM,* in press, 2000.

36. E. Minkov, M. Ungarish, M. Israeli "The motion generated by a Rising Particle in a Rotating Fluid - numerical solutions. Part 1: The short container case," *J. Fluid Mech.*, Vol 413, pp. 111-148, 2000.

37. M. Ungarish, H.E. Huppert " High Reynolds number gravity currents over a porous boundary: shallow-water solutions and box-model approximations," *J. Fluid Mech.*, Vol. 418, pp. 1-23, 2000.

38. J. Mang, M. Ungarish, U. Schaflinger, "Gravitational-centrifugal separation in an axisymmetric source-sink flow with a free surface," *Int. J. Multiphase Flow*, Vol. 27, pp. 197-215, 2001.

39. M. Ungarish, "On the separation of a suspension in a tube centrifuge," *Int. J. Multiphase Flow*, Vol. 27, pp. 1285-1291, 2001.

40. M. A. Hallworth, H.E. Huppert, M. Ungarish, "Axisymmetric gravity currents in a rotating system: experimental and numerical investigations," *J. Fluid Mech.*, Vol. 447, pp. 1-29, 2001.

41. A. J. Hogg, M. Ungarish, H.E. Huppert "Effects of particle-sedimentation and rotation on axisymmetric gravity currents," *Physics of Fluids*, Vol. 13, pp. 3687-3698, 2001.

42. E. Minkov, M. Ungarish, M. Israeli "The motion generated by a Rising Particle in a Rotating Fluid - numerical solutions. Part 2: The long container case," *J. Fluid Mech.*, Vol. 454, pp. 345-364, 2002.

43. M. Ungarish, H.E. Huppert "On gravity currents propagating at the base of a stratified ambient". *J. Fluid Mech.*, Vol. 458, pp. 283-307, 2002.

44. J. B. Flor, M. Ungarish, J. W. M. Bush "Spin-up from rest in a stratified fluid: boundary flows," *J. Fluid Mech.*, Vol. 472, pp. 51-82, 2002.

45. M. Ungarish, J. Mang "Spin-up from rest of a two-layer fluid about a vertical axis," *J. Fluid Mech.*, Vol. 474, pp. 117-145, 2003.

46. M. Ungarish, T. Zemach "On axisymmetric rotating gravity currents: two-layer shallow-water and numerical solutions," *J. Fluid Mech.*, Vol. 481, pp. 37-66, 2003.

47. M. Ungarish "On the separation of a suspension in a tube centrifuge: critical comments on theoretical models and experimental verifications," *Archive Appl. Mech.*, Vol. 73, pp. 399-408, 2003.

48. M. A. Hallworth, H.E. Huppert, M. Ungarish "On inwardly propagating axisymmetric gravity currents" *J. Fluid Mech.*, Vol. 494, pp. 255-274, 2003.

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3. M. Ungarish, H.P. Greenspan, "On a Fundamental Problem in Two-Phase Centrifugal Separation," *Proc. Separation Phenomena in Liquids and Gases, First Workshop,* edited by K. G. Roesner and E. Raetz, Tech. Hochschule Darmstadt, Germany, pp. 419-429, 1987.

4. M. Ungarish, "Spin-Up from Rest of a Suspension - A Preliminary Insight," *Proc. Separation Phenomena in Liquids and Gases, Second Workshop,* edited by P. Louvet, P. Noe and Soubbaramayer, Centre d'Etudes Nuclearaires de Saclay, France, pp. 433-443, 1989.

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NOTE: See also section e below.

d) Professional and Research Projects:

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e) Survey, Keynote and Invited Papers

1. M. Ungarish, "Modeling, Simulation and Comprehension of Separating Particle-Fluid Flows," invited for *Separation Phenomena in Liquids and Gases, Second Workshop*, Versailles, France, published in Proceedings edited by P. Louvet, P. Noe and Soubbaramayer, Centre d'Etudes Nuclearaires de Saclay, France, pp. 445-475, 1989.

2. M. Ungarish, "On Recent Developments in the Theory of Centrifugal Separation of Suspensions," invited for *Separation Phenomena in Liquids and Gases, Third Workshop ,* Charlottesville, Virginia, USA, published in Proceedings edited by H.G. Wood, Un. of Virginia, pp. 1-6, 1992.

3. M. Ungarish, "Recent Developments in the Analysis of Centrifugal Separations and Unfolding Challenges in the Classic Theory of Rotating Fluids," Keynote lecture, *EUROMECH 336 Colloquium on Flows Dominated by Centrifugal and Coriolis Forces,* Trondheim, Norway, June 1995.

4. M. Ungarish, "Recent Developments in the Analysis of Gravity and Centrifugal Separation of Non-Colloidal Suspensions and Unfolding Challenges in the Classic Mechanics of Fluids," CISM - Int. Centre for Mechanical Sciences course and meeting on *Flow of Particles in Suspensions*, Udine, Italy, October 1995.

5. M. Ungarish, "Modeling and Simulation of Rotating Buoyant Suspensions - Fundamentals and Challenges," Keynote lecture, *1997 International Mechanical Engineering Congress (ASME), Symposium on rotating and buoyancy-driven flows*, Dallas, USA, November 1997, published in Proceedings of the ASME edited by Valentine D. T. and Jahnke C. C. (OED-Vol. 14, pp. 53-66).

6. M. Ungarish, "On Axisymmetric Gravity Currents: results and open questions for the rotating and/or particle-driven cases," Invited lecture, *1999 Annual Meeting of the L. Euler Swiss Center of European Res. Community on Flow, Turbulence and Combustion (ERCOFTAC), topic "Multiphase Flow"*, Zurich, Switzerland, November 1999.

7. M. Ungarish, "Spin-up from rest of multi-layer and stratified fluids about a vertical axis," Invited lecture, *Fundamentals of Fluid Flow meeting 2001 (FFF2001)*, BP Institute, Cambridge, UK, December 2001.

8. M. Ungarish, G. Seiden, G. Lipson, "The role of inertial waves in the pattern formation of a suspension in a cylinder rotating about a horizontal axis at small Ekman and Rossby numbers," IUTAM Symposium on Recent Advances in Multiphase Flows: Numerical and experimental, Istanbul, Turkey, June 2007.

9. M. Ungarish, "Theoretical investigations of gravity currents and intrusions in linearly stratified ambients," Plumes and Gravity Currents in Stratified Environments workshop, Edmonton, Canada, October 2007.

10. M. Ungarish, "Models for Gravity Currents and Intrusions: from complex physics to simple mathematics and back to applications," plenary lecture for Mathematical Models and Methods in Modern Science IEEEAM meeting, Puerto De la Cruz, Tenerife, Spain, December 2011.

11. M. Ungarish, "Gravity currents in non-rectangular channels and in bi-stratified systems," Workshop on Environmental and Extreme Multiphase Flows, Gainesville, Fl., USA, March 2012.

12. M. Ungarish, "The Flow of Gravity Currents and Intrusions: A Test-Case for the Power and Limitations of Simple Mathematical Models in the Prediction of Complex Phenomena" plenary lecture 11th International Conference on Fluid Mechanics and Aerodynamics (FMA '13), Vouliagmeni, Athens, Greece May 14-16, 2013.

f) Books

1) Published

1. M. Ungarish, *Hydrodynamics of Suspensions: Fundamentals of Centrifugal and Gravity Separation*, Springer-Verlag, 1993 (317 pages, 85 figures. Reviews in: (1) Int. J. Multiphase Flow, vol.20, p. 1169, 1994, by W. Schneider; (2) J. Fluid Mech., vol. 290, pp. 406–408, 1995, by F. H. Bark).

2. M. Ungarish, *An Introduction to Gravity Currents and Intrusions*, CRC Press, Taylor and Francis Group (Boca Raton London New York), 2009 (489 pages. Reviews in: J. Fluid Mech., vol. 649, pp. 537-539, 2010, by M. R. Flynn; and Int. J. Multiphase Flow, vol. 37, pp. 1254-1255, by T. Bonometti).

3. M. Ungarish, *Gravity currents and Intrusions - Analysis and Prediction*, World Scientific Publishing, (New Jersey London Singapure Tokyo), 2020 (786 pages).

g) Sections in Books

1. M. Ungarish, "On the Quasi-Geostrophic Drag on a Rising Sphere in a Rotating Fluid," in *Computational Fluid Dynamics, Selected Topics*, edited by D. Leutloff and R.C. Scrivastava, pp. 197–202, Springer-Verlag, 1995.

2. M. Ungarish, "Recent Developments in the Analysis of Gravity and Centrifugal Separation of Non-Colloidal Suspensions and Unfolding Challenges in the Classic Mechanics of Fluids," in *Flow of Particles in Suspensions - Lecture Notes*, edited by U. Schaflinger, Springer-Verlag, 1996.

3. M. Ungarish, "Gravity Currents and Intrusion," in *Handbook of Environmental Fluid Dynamics*, Vol. 1., edited by H. J. S. Fernando, Taylor and Francis, 2013.

4. T. Agrawal, M. Ungarish and V. Chalama, "On the equivalence of top and bottom gravity currents in a linearly stratified channel — a review and extension of data processing and prediction theory" Chapter 6 in AGU 291 monograph "Particulate Gravity Currents," edited by B. Kneller, E. Meiburg , B. Vowinckel, and Z. He, Willey 2025, ISBN: 978-1-394-21671-0.

h) Book Reviews (published)

1. "Fundamentals of Engineering Numerical Analysis by P. Moin, Cambridge University Press," in *Int. J. Multiphase Flow*, Vol. 28, 2002.

Graduate Students *(Completed)*

1. Clara Daitzchman, M.Sc. research. Primary Supervisor: Prof. C. Aharony, Dept. of Chemical Engineering, Technion - Israel Institute of Technology. Thesis Title: *Kinetics of Adsorbtion with Penetration of the Adsorbate in Subsurface Layers.* (1989)

2. Ron Resnick, Dept. Computer Science, Technion - Israel Institute of Technology. M.Sc. Research on: *Numerical Analysis of Two-Phase Rotating Flow.* (1990)

3. Anath Helman, Dept. Computer Science, Technion - Israel Institute of Technology. M.Sc. Research on: *Numerical Parallel Solution of Elliptic P.D.E.'s in a Two Dimensional Domain.* (1990).

4. Dmitri Vedensky, Applied Mathematics, Technion - Israel Institute of Technology. Ph.D. Research on: *Modeling and Investigation of Particles in Fluid Flow Fields.* (1994).

5. Eugene Reyzer, Applied Mathematics, Technion. M.Sc. Research on: *Numerical Parallel Solution of Two-Point Boundary Value Problems.* (1997). (Co-advisor: Prof. I. Yavneh.)

6. Eli Minkov, Computer Science, Technion. Ph.D. Research on: *Simulations of Rotating Fluids.* (1998) (Advisor during sabbatical: Prof. M. Israeli.)

7. Tamar Zemach, Applied Mathematics, Technion. M.Sc. Research on: *Gravity currents: two-layer and asymptotic extensions.* (2002)

8. Orit Cohen, Computer Science, Technion. M.Sc. Research on: *Simulation and visualization of gravity currents.* (2004) Co-advisor: Prof. G. Elber.

9. Gabriel Seiden, Faculty of Physics, Technion. Ph.D. Research on: *Segregation of a suspension in a gravitational-centrifugal field.* (2006) Co-advisor: Prof. S. G. Lipson.

10. Tamar Zemach, Computer Science, Technion. Ph.D. Research on: *Simulation of non-homogeneous flow fields subject to rotation and gravity effects.* (2008)

11. Ron Goldman Applied Mathematics, Technion. M.Sc. Research on: *Gravity current generated by difference in stratification* (2015) Co-advisor: Prof. I. Yavneh

12. Fabio Addona, Civil Eng. University of Parma, Italy. M.Sc. Research on: *Experimental investigation of gravity currents in channels with circular cross-section* (2015) Co-advisor: Prof. S. Longo.