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Eğitimi

Doktora 1983, *Akışkanlar Mekaniği ve Termodinamik*,
Brown University, A.B.D.

Yüksek Lisans 1979, *İstatistiksel Fizik*,
Lehigh University, A.B.D.

Lisans 1976, *Makine Mühendisliği*,
İstanbul Teknik Üniversitesi

İş Deneyimi

2009 - Profesör

Işık Üniversitesi, Makine Mühendisliği Bölümü, İstanbul.

2000 - 2009 Profesör

İstanbul Teknik Üniversitesi, Uzay Mühendisliği Bölümü, İstanbul.

1999 - 2000 Başuzman araştırmacı

TÜBİTAK Temel Bilimler Araştırma Enstitüsü (Feza Gürsey Enstitüsü)

1994 - 1999 Profesör

İstanbul Üniversitesi, Makine Mühendisliği Bölümü, İstanbul.

1990 - 1993 Doçent

Bilkent Üniversitesi, Matematik Bölümü, Ankara.

1988 - 1990 Doçent

Boğaziçi Üniversitesi, Matematik Bölümü, İstanbul.

1984 - 1988 Yardımcı Doçent

Boğaziçi Üniversitesi, Matematik Bölümü, İstanbul.

İdari Görevleri

2007 - 2008 Disiplinlerarası Uçak ve Uzay Mühendisliği Programı Anabilim Dalı Başkanı, İstanbul Teknik Üniversitesi, Fen Bilimleri Enstitüsü, İstanbul.

2002 - 2005 Uçak ve Uzay Bilimleri Fakülte Yönetim Kurulu Üyesi, İstanbul Teknik Üniversitesi, İstanbul.

2002 – 2009 Uçak ve Uzay Bilimleri Fakültesi Senatörü, İstanbul Teknik Üniversitesi, İstanbul.

2001 - 2009 Uçak ve Uzay Bilimleri Fakülte Kurulu Üyesi, İstanbul Teknik Üniversitesi, İstanbul.

Yurtdışı Deneyimleri

- Misafir Profesör
Institut für Strömungslehre und Strömungsmaschinen,
Universitaet Karlsruhe (TH), Almanya
1.09.1991-30.10.1992,
1.10.1993-31.12.1993,
1.07.1997-15.10.1997,
1.07.1998-30.09.1998
- Misafir Profesör
Max Planck Institut für Strömungsforschung,
Göttingen, Almanya
1.11.1992-28.02.1993,
1.07.1993-30.09.1993
- Misafir Profesör
Department of Mechanical Engineering,
The City College of New York, CUNY, NY, A.B.D.
1.1994-30.06.1994
- Misafir Profesör
Institute of Thermomechanics, Academy of Sciences of the Czech Republic, Prague
1.07.1994-1.09.1994,
15.07.2001- 15.09.2001,
10.07.2006 - 9.09.2006
- Misafir Profesör
Department of Applied Mathematics and Theoretical Physics, University of Cambridge,
İngiltere
15.08.1995-30.09.1995,
1.10.1998-15.11.1998
- Misafir Profesör
Department of Applied Physics,
Eindhoven University of Technology, Hollanda
1.10.1995-31.12.1995,
1.09.1996-15.10.1996,
15.10.1999-15.01.2000

- Misafir Profesör
Department of Mechanical Engineering
California Institute of Technology, Pasadena, A.B.D.
1.07.2000-30.09.2000
- Misafir Profesör
Department of Mechanical Engineering
University of Tokyo, Japonya
1.07.2002-30.09.2002
- Misafir Profesör
Department of Mechanical Engineering,
Worcester Polytechnic Institute (WPI), A.B.D.
14.07.2003-14.09.2003,
12.07.2004-15.09.2004,
12.07.2005-15.09.2005
- Misafir Profesör
Lehrstuhl für Fluidmechanik, Fachgebiet Gasdynamik
Technische Universität München, Almanya
25.06.2007-24.09.2007,
30.06.2008-29.09.2008,
29.06.2009-14.08.2009

Verdiği Dersler

- Isı Geçişi (İTÜ)
- Sayısal Analiz, (İTÜ)
- Gaz Dinamiği, (İTÜ)
- Fiziksel Gaz Dinamiği, (Yüksek Lisans, İTÜ)
- Mühendislik Matematiği, (Yüksek Lisans, İTÜ)
- Kısmi Diferansiyel Denklemlere Giriş, (İTÜ)
- Mühendislikte Kısmi Diferansiyel Denklemler, (Yüksek Lisans, İTÜ)
- Termodinamik, (İTÜ, Işık Üni.)
- Akışkanlar Mekaniği, (Işık Üni.)
- Olasılık, (Işık Üni.)

Ödüller ve Burslar

Sedat Simavi Fen Bilimleri Ödülü

(1984).

TÜBİTAK Teşvik Ödülü (1991).
TÜBA (Türkiye Bilimler Akademisi) Asosiye Üyeliği (1995).

Araştırma Konuları

- Çekirdekleşme ve Yoğuşma
- Yoğuşma durumunda gaz dinamiği
- Kabarcık dinamiği ve uygulamaları
- Çok fazlı akışlarda nonlinear dalga yayılması
- Hidrodinamik kavitasyon

Yayınlar

A. ÇAĞRILI KİTAP BÖLÜMÜ:

- C.F.Delale, G.H.Schnerr and M.E.H. van Dongen, Condensation Discontinuities and Condensation Induced Shock Waves. *Shock Waves Science and Technology Reference Library. Vol. 1 Multiphase Flows* (ed. M.E.H.van Dongen) pp.187-230, Springer, February 2007 ISBN 3540358455

B. ULUSLARARASI HAKEMLİ DERGİLER

1. C.F.Delale, Lower Bound Estimate for Droplet Size in Two-Phase Dispersed Flow, *ASME Journal of Heat Transfer* **102** (1980) 501-507.
2. C.F.Delale, The Hilbert Expansion to the Boltzmann Equation for Steady Flow, *Journal of Statistical Physics* **28** (1982) 589-602.
3. C.F.Delale, The H Theorem and Irreversible Thermodynamics, *Journal of Statistical Physics* **37** (1984) 451-463.
4. C.F.Delale, Irreversible Thermodynamics of Kinetic Processes in Multiple Gas Mixtures, *Journal of Chemical Physics* **83**(6) (1985) 3062-3068.
5. C.F.Delale, The Hilbert Theory of Transport Phenomena in Multiple Gas Mixtures, *Journal of Chemical Physics* **83**(6) (1985) 3069-3076.
6. C.F.Delale, The Generalized H Theorem in the Hilbert Theory, *Journal of Chemical Physics* **84**(2) (1986) 971-975.
7. J.H.Clarke and C.F.Delale, Nozzle Flows with Nonequilibrium Condensation, *Physics of Fluids* **29**(5) (1986) 1398-1413.

8. J.H.Clarke and C.F.Delale, Supercritical Shocks in Nozzle Flows with Nonequilibrium Condensation, *Physics of Fluids* **29**(5) (1986) 1414-1418.
9. J.H.Clarke and C.F.Delale, Expansion Flows on Walls with Nonequilibrium Condensation, *Quarterly of Applied Mathematics* Vol. **XLVI** No. 1 (1988) 121-143.
10. C.F.Delale, An Exactly Solvable Two-Fold Cayley Tree Model, *International Journal of Modern Physics B* Vol. **3** No. 10 (1989)1523-1537.
11. C.F.Delale, On the Transition from Ferromagnetism to Antiferromagnetism on Two-Fold Cayley Tree, *Il Nuovo Cimento* Vol. **14D** (1992) 261-270.
12. C.F.Delale, G.H.Schnerr and J.Zierp, The Mathematical Theory of Thermal Choking in Nozzle Flows, *Z Angew Math Phys (ZAMP, Journal of Applied Mathematics and Physics)* Vol. 44 (1993) 943-976.
13. C.F.Delale, G.H.Schnerr and J.Zierp, Asymptotic Solution of Transonic Nozzle Flows with Homogeneous Condensation. I.Subcritical Flows, *Physics of Fluids A* **5** (1993) 2969-2981.
14. C.F.Delale, G.H.Schnerr and J.Zierp, Asymptotic Solution of Transonic Nozzle Flows with Homogeneous Condensation. II.Supercritical Flows, *Physics of Fluids A* **5** (1993) 2982-2995.
15. C.F.Delale and G.E.A.Meier, A Semi-Phenomenological Droplet Model of Homogeneous Nucleation from the Vapor Phase, *Journal of Chemical Physics* **98** (1993) 9850-9858.
16. C.F.Delale and G.H.Schnerr, Near Critical Transonic Nozzle Flows with Homogeneous Condensation, *Acta Mechanica Suppl.* **4** (1994) 125-131.
17. C.F.Delale and G.E.A.Meier, Real Gas Effects in Thermally Choked Nozzle Flows, *Z Angew Math Phys (ZAMP, Journal of Applied Mathematics and Physics)* **45** (1994) 245-257.
18. C.F.Delale, G.H.Schnerr and J.Zierp, Asymptotic Solution of Shock Tube Flows with Homogeneous Condensation, *Journal of Fluid Mechanics* **287** (1995) 93-118.
19. C.F.Delale, G.H.Schnerr and F.Marsik, Theory of Embedded Shock Formation in Rarefaction Waves by Homogeneous Condensation, *European Journal of Mechanics B / Fluids* **15** (1) (1996) 81-102.
20. C.F.Delale and G.E.A.Meier, A Comparison of Nucleation Theories by the Asymptotic Solution of Condensing Nozzle Flows, *Acta Mechanica* **117** (1996) 23-32.

21. C.F.Delale and G.H.Schnerr, Transient Effects of Nucleation in Steady and Unsteady Condensing Flows, *International Journal of Multiphase Flow* **22** (4) (1996) 767-781.
22. C.F.Delale, M.J.E.H.Muitjens and M.E.H.van Dongen, Asymptotic Solution and Numerical Simulation of Homogeneous Condensation in Expansion Cloud Chambers, *Journal of Chemical Physics* **105** (19) (1996) 8804-8821.
23. C.F.Delale and D.G.Crighton, Prandtl-Meyer Flows with Homogeneous Condensation. Part 1. Subcritical Flows, *Journal of Fluid Mechanics* **359** (1998) 23-47.
24. C.F.Delale and M.E.H. van Dongen, Thermal Choking in Two-Dimensional Expansion Flows, *Z Angew Math Phys (ZAMP, Journal of Applied Mathematics and Physics)* **49** (1998) 515-537.
25. C.F.Delale, G.H.Schnerr and J.Sauer, Quasi-one-dimensional steady-state Cavitating Nozzle Flows, *Journal of Fluid Mechanics* **427** (2001) 167-204.
26. C.F.Delale and D.G.Crighton, Prandtl-Meyer Flows with Homogeneous Condensation. Part 2. Supercritical Flows, *Journal of Fluid Mechanics* **430** (2001) 231-265.
27. C.F.Delale, G.Lamanna and M.E.H. van Dongen, On the Stability of Stationary Shock Waves in Nozzle Flows with Homogeneous Condensation, *Physics of Fluids* **13** (2001) 2706-2719.
28. C.F.Delale, Thermal Damping in Cavitating Nozzle Flows, *ASME Journal of Fluids Engineering*, **124** (2002) 969-976.
29. C.F.Delale, J.Hruby and F.Marsik, Homogeneous Bubble Nucleation in Liquids: The Classical Theory Revisited, *Journal of Chemical Physics*, **118** (2003) 792-806.
30. F.Marsik, C.F.Delale and M.Sedlar, Condensation and Cavitation in Water and Water Mixtures, *Archives in Thermodynamics*, **24**(1) (2003) 3-16.
31. C.F.Delale and M.Tunç, A Bubble Fission Model for Collapsing Cavitation Bubbles, *Physics of Fluids*, **16** (2004) 4200-4203.
32. C.F.Delale, K.Okita and Y.Matsumoto, Steady-State Cavitating Nozzle Flows with Nucleation, *ASME Journal of Fluids Engineering*, **127**, 770-777 (2005).
33. C.F.Delale, S.Nas and G.Tryggvason, Direct Numerical Simulation of Shock Propagation in Bubbly Liquids, *Physics of Fluids*, **17**, 121705-1-4 (2005).
34. C.F. Delale and G. Tryggvason, Shock structure in Bubbly Liquids: Comparison of Direct Numerical Simulations and Model Equations, *Shock Waves*, **17** (2008) 433-440 (DOI 10.1007/s00193-008-0126-1).

35. A.Acrivos and C.F.Delale, Report on IUTAM Symposium on Recent Advances in Multiphase Flows: Numerical and Experimental (11-14 June 2007, Istanbul, Turkey), *Physics of Fluids*, **20** (2008) 040501-1-11.
36. C.F.Delale, G.Tryggvason and S.Nas, Cylindrical Bubble Dynamics: Exact and DNS Results, *Physics of Fluids*, **20** (2008) 040903-1-10.
37. Ş. Pasinlioğlu, C.F. Delale and G.H.Schnerr, On the Temporal Stability of Steady-State Quasi-One-Dimensional Cavitating Bubbly Flow Solutions, *IMA Journal of Applied Mathematics*, **74** (2009) 230-249 (doi:10.1093/imamat/hxn036).

C. YAYINLANMIŞ KONFERANS BİLDİRİLERİ

1. C.F.Delale, (invited) An Asymptotic Predictive Method for Gas Dynamics with Nonequilibrium Condensation, *Proceedings of IUTAM Symposium on "Adiabatic Waves in Liquid-Vapor Systems"*, 28 August-1 September 1989, Göttingen, (eds.) Meier,G.E.A and Thompson,P.A., (Springer-Verlag, Berlin and Heidelberg, 1990) 143-157.
2. C.F.Delale, (invited, in Turkish) Irreversibility, Mechanics and Thermodynamics, *Proceedings of the Vth National Congress of Mechanics*, 7-11 September 1987, Kirazlıyayla, Bursa, (eds.) M.Dikmen and E.İnan (İTU İnşaat Fakültesi, İstanbul, 1990) 268-278.
3. C.F.Delale, (in Turkish) Gas Dynamics with Nonequilibrium Condensation, *Proceedings of the VIth National Congress of Mechanics*, 11-15 September 1989, Kirazlıyayla, Bursa, (eds.) M.Dikmen and E.İnan (İTU İnşaat Fakültesi, İstanbul, 1990) 268-278.
4. C.F.Delale, (invited, in Turkish) The Hilbert Solution of the Boltzmann Equation *Proceedings of Third Symposium on Differential Equations*, 26-28 October 1989, Trakya University, Edirne, (eds.) M.Dikmen and O. Çelebi (Boğaziçi Üniversitesi Matbaası, İstanbul, 1990) 33-44.
5. G.H.Schnerr and C.F.Delale, On Thermally Choked Nozzle Flows, *Proceedings of 2. ISAIIF International Symposium on Experimental and Computational Aerothermodynamics of Internal Flows*, Prague, July 12-15, 1993, (eds.) R.Dvorak and J. Kvapilova, Vol. **2**, Society of Czech Mathematicians and Physicists, 485-490 (1993).
6. C.F.Delale, G.H.Schnerr and J.Zierep, Shock Tube Flows with Homogeneous Condensation, *Proceedings of 2nd International Conference on Fluid Mechanics (ICFM-II)*, Beijing, July 7-10, 1993. (ed.) Z. Fenggan, Peking University Press, 293-298 (1993).

7. C.F.Delale and G.H.Schnerr, On the Onset of Condensation in Rarefaction Waves in Shock Tubes, *Shock Waves Marseille III, Shock Waves in Condensed Matter and Heterogeneous Media (Proceedings of the 19th International Symposium on Shock Waves , Marseille, July 26-30, 1993)* (eds.) R.Brun, L.Z.Dumitrescu. Springer-Verlag, 131-134 (1995).
8. C.F.Delale and G.H.Schnerr, (invited) Theoretical Investigation of Condensation Dynamics in Shock Tubes, *Fluid Mechanics and its Applications Vol. 31 (Proceedings of IUTAM Symposium "Waves in Gas-Liquid and Gas-Particle Two- Phase Systems", Kyoto, May 9-13, 1994.)* (eds.) S.Morioka and L. van Wijngaarden, Kluwer Academic Publishers, 365-375 (1995).
9. C.F.Delale, F.Marsik and G.H.Schnerr, On the Formation of Embedded Shock Waves in Rarefaction Waves by Homogeneous Condensation, *Proceedings of the 20th International Symposium on Shock Waves Vol.II*, Pasadena, California,USA, July 23-28, 1995 (eds.) B.Sturtevant, J.E.Shepherd & H.G.Hornung, World Scientific, Singapore 1237-1242 (1996).
10. C.F.Delale, (invited) Shock Formation in Flows with Nucleation and Condensation, *Proceedings of Metastable Behavior of Fluids and Critical Phenomena*, Prague, October 30-31, 1996 (ed.) F.Marsik, Institute of Thermomechanics, Academy of Sciences of the Czech Republic, 7-24 (1996).
11. C.F.Delale and G.H.Schnerr, Asymptotic Solution of Flows with Nucleation and Condensation}, *Proceedings of the Second International Conference on "Asymptotics in Mechanics AIM'96 "*, Saint Petersburg State Marine Technical University, Saint Petersburg, Russia, October 13-16, 1996 (eds.) Ali H. Nayfeh and Kirill V. Rozhdestvensky, Saint Petersburg, 81-88 (1996).
12. C.F.Delale and G.H.Schnerr, Quasi-one-dimensional Cavitating Nozzle Flows. *Proceedings of Third International Conference on Multiphase Flow (CD ROM)* 615-620, June 8-12, 1998, Lyon, France (eds.) J. Bataille, A. Joia (1998).
13. C.F.Delale, Continuum Modelling of Flows with Nucleation and Condensation, *Proceedings of Continuum Models and Discrete Systems 9 (CMDS9)*, Istanbul, 29 June-3 July 1998, (eds.) E. Inan and K.Z. Markov, World Scientific Publishing Co., pp. 14-21 (1998).
14. C.F.Delale, Thermal Damping in Cavitating Nozzle Fows, *Proceedings of the Fourth International Symposium on Cavitation*, Pasadena, California, USA, June 19-23, 2001 (ed.) C.E. Brennen (2001) (online [at http://cav2001.library.caltech.edu](http://cav2001.library.caltech.edu)).
15. F.Marsik, C.F.Delale and M.Sedlar, (Keynote Lecture) Condensation and Cavitation in Water and Water Mixtures, *Proceedings of HEAT 2002, the Third International*

Conference on Transport Phenomena in Multiphase Systems, Kielce, Poland, June 24-27, 2002, pp. 61-68.

16. C.F. Delale, J.Hruby and F. Marsik, The Classical Theory of Homogeneous Bubble Nucleation Revisited, *Fifth International Symposium on Cavitation*, Osaka, Japan, November 1-4, 2003. *Paper No.:* Cav03-GS-1-002 (CD ROM and online at <http://flow.me.es.osaka-u.ac.jp/cav2003/>).

17. M.Tunç and C.F. Delale, Energy Dissipation due to Fission of Cavitating Bubbles, *Fifth International Symposium on Cavitation*, Osaka, Japan, November 1-4, 2003. *Paper No :* Cav03-GS-2-003 (CD ROM and online at <http://flow.me.es.osaka-u.ac.jp/cav2003/>).

18. C.F. Delale, K. Okita and Y. Matsumoto , Steady-State Cavitating Nozzle Flows with Nucleation, *Fifth International Symposium on Cavitation*, Osaka, Japan, November 1-4, 2003. *Paper No.:* Cav03-GS-4-001 (CD ROM and online at <http://flow.me.es.osaka-u.ac.jp/cav2003/>).

19. C.F.Delale, (invited) A Cavitating Bubbly Flow Model with Bubble/Bubble Interactions, Thermal Damping and Bubble Fission, in *Proceedings of Second International Summer Scientific School on High Speed Hydrodynamics*, Cheboksary, Russia , June 27-July 3, 2004, (ed.) A. Terentiev (2005) pp. 65-72.

20. C.F. Delale, S.Nas and G.Tryggvason, (invited) "Direct Numerical Simulations of Shock Propagation in Bubbly Liquids" *IUTAM Symposium on Computational Approaches to Disperse Multiphase Flow*, Argonne National Laboratory, USA, 4-7 October 2004 (Fluid Mechanics and its Applications Kluwer-Springer series, 2006, pp. 323-330, eds. S. Balachander and A.Prospereetti, pp. 323-330).

21. C.F. Delale and G. Tryggvason, Shock structure in bubbly liquids: Comparison of Direct Numerical Simulations and Model Equations, *CAV2006 Sixth International Symposium on Cavitation Paper No. : 94* , 11-15 September 2006, Wageningen, The Netherlands (CD ROM, ed. G. Kuiper and online at <http://www.cav2006.com>).

22. C.F. Delale, G.H.Schnerr and S. Pasinlioglu, Model Evolution Equations for Unsteady Cavitating Nozzle Flows and Their Applications, *CAV2006 Sixth International Symposium on Cavitation Paper No. : 112*, 11-15 September 2006, Wageningen, The Netherlands (CD ROM, ed. G. Kuiper and online at <http://www.cav2006.com>).

23. C.F. Delale, G.H.Schnerr and S. Pasinlioglu, On the Temporal Stability of Steady-State Cavitating Nozzle Flow Solutions, *ICMF2007 Sixth International Symposium on Multiphase Flows Paper No. : 112*, 11-15 July 2007, Leipzig, Germany (CD ROM, ed. M.Sommerfeld and online at <http://www.icmf2007.com>).

24. C.F. Delale, Z.Başkaya, S.J.Schmidt and G.H.Schnerr, Unsteady Bubbly Cavitating Nozzle Flows, *CAV2009 Seventh International Symposium on Cavitation Paper No. : 18*, 17-22 August 2009, Ann Arbor, Michigan, USA (CD ROM, ed. S. Ceccio).

Projeler

A. TÜBA (Türkiye Bilimler Akademisi) Destekli Projeler :

- Kabarcıklar için Homojen Çekirdekleşme Kuramı. (2002-2003) Telif hakkı olarak TÜBA'nın öngördüğü destek alınmıştır.
- Hidrodinamik Kaviteasyon. (1998-2003) Telif hakkı olarak TÜBA'nın öngördüğü destek alınmıştır.
- Yoğuşmadan Kaynaklanan Şok Dalgalarının Kararlılığı (1999-2000) Telif hakkı olarak TÜBA'nın öngördüğü destek alınmıştır.
- Faz Geçişleri Halinde Prandtl-Meyer Akışları (1995-1998) Telif hakkı olarak TÜBA'nın öngördüğü destek alınmıştır.

B. İTÜ Destekli Araştırma Projeleri :

- Daimi Olmayan Kaviteasyonlu Akışlar (23 Temmuz 2001 – 23 Temmuz 2003) Proje No. 1874. Bütçesi : 5 Milyar 650 Milyon TL.

C. TÜBİTAK 1001 Kodlu Araştırma Projesi (105M035 No.lu Proje):

- Sıvılaştırılmış Yakıtlı Türbopompaların Tasarımı ve Kaviteasyon Optimizasyonu (1 Eylül 2005 -1 Mart 2008) Proje No. 105M035 TÜBİTAK MAG ,
Bütçesi :147 640,- YTL.

Bilimsel Kuruluşlara Üyelikler

- American Physical Society
- TÜBA (Türkiye Bilim Akademisi) Asosiye Üye (1995-2003)
- EUROMECH (European Mechanics Society)
- Teorik ve Uygulamalı Mekanik Türk Milli Komitesi
- Türk Matematik Derneği