CONSTANTINE M. DAFERMOS

CURRICULUM VITAE

Date and Place of Birth

May 26, 1941, Athens, Greece
Naturalized U. S. Citizen, 1979

Position

Alumni-Alumnae University Professor
Division of Applied Mathematics
Brown University
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Home Address

87 Woodbury Street
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Education

Diploma in Civil Engineering, National Technical University of Athens, 1964
Ph.D., The Johns Hopkins University, 1967.

Professional Appointments

1987 – Present Alumni-Alumnae University Professor, Brown University.

1976 – Present Professor, Division of Applied Mathematics, Brown University.

2006 – 2007 Director, Lefschetz Center for Dynamical Systems.

1988 – 1993 Director, Lefschetz Center for Dynamical Systems.

1971 – 1976 Associate Professor, Division of Applied Mathematics, Brown University.

1968 – 1971 Assistant Professor, Department of Theoretical and Applied Mechanics, Cornell University.

1967 – 1968 Postdoctoral Fellow, Department of Mechanics, The Johns Hopkins University.

Publications

"The Elastic Strip Under Mixed Boundary Conditions," (with P. S. Theocaris), *J. Appl. Mech.*, 31 (1964), 714-716.

"A Critical Review on the Thickness Effect of Birefringent Coatings," (with P. S. Theocaris), *Exp. Mech.*, (1964), 1-6.

"On the Existence and the Asymptotic Stability of Solutions to the Equations of Linear Thermoelasticity," *Arch. Rat. Mech. Analysis*, 29 (1968), 241-271.

"Stability of Orientation Patterns of Liquid Crystals Subject to Magnetic Fields," *SIAM J. Appl. Math.*, 16 (1968), 1305-1318.

"Some Remarks on Korn's Inequality," *Zeit. Ang. Math. Phys.*, 19 (1968), 913-920.

"The Mixed Initial-boundary Value Problem for the Equations of Non-linear Viscoelasticity," *J. Diff. Equations*, 6 (1969), 71-86.

"Disinclinations in Liquid Crystals," *Quart. J. Mech. Appl. Math.*, 23 (1970), S49-S64.

"Wave Equations with Weak Damping," *SIAM J. Appl. Math.,* 18 (1970), 759-767.

"An Abstract Volterra Equation with Applications to Linear Viscoelasticity," *J. Diff. Equations,* 7 (1970), 554-569.

"Asymptotic Stability in Viscoelasticity," *Arch. Rat. Mech. Analysis,* 37 (1970), 297-308.

"An Invariance Principle for Compact Processes," *J. Diff. Equations,* 9 (1971), 239-252.

"Applications of the Invariance Principle for Compact Processes," *J. Diff. Equations,* 9 (1971), 291-299.

"Polygonal Approximations of Solutions of the Initial Value Problem for a Conservation Law," *J. Math. Anal. and Applications,* 38 (1972), 33-41.

"Uniform Processes and Semicontinuous Liapunov Functionals," *J. Diff. Equations,* 11 (1972), 401-415.

"Asymptotic Behavior of Solutions of a Hyperbolic Conservation Law," *J. Diff. Equations,* 11 (1972), 416-424.

"Asymptotic Behavior of Nonlinear Contraction Semigroups," (with M. Slemrod), *J. Functional Analysis,* 13 (1973), 97-106.

"The Entropy Rate Admissibility Criterion for Solutions of Hyperbolic Conservation Laws,"*J. Diff. Equations,* 14 (1973), 202-212.

"Solution of the Riemann Problem for a Class of Hyperbolic Systems of Conservation Laws by the Viscosity Method," *Arch. Rat. Mech. Analysis,* 52 (1973), 19.

"Structure of Solutions of the Riemann Problem for Hyperbolic Systems of Conservation Laws," *Arch. Rat. Mech. Analysis,* 53 (1974), 203-217.

"Quasilinear Hyperbolic Systems," in *Nonlinear Waves,* (S. Leibovich and A.R. Seebass, Eds.), Cornell University Press, (1974), 82-102.

"Semiflows Generated by Compact and Uniform Processes," *Math. Systems Theory,* 8 (1974), 142-149.

"What Does the Qualitative Theory of Differential Equations Have to Offer to Stability Theory?" *Proc. VI-U. S. Nat. Congress Applied Mechanics,* (1974), 87-92.

"The Entropy Rate Admissibility Criterion in Thermoelasticity," *Accad. Naz. dei Lincei, Ser. VIII,* Vol. LVII (1974), 113-119.

"The Riemann Problem for Certain Classes of Hyperbolic Systems of Conservation Laws," (with R.J. DiPerna), *J. Diff. Equations,* 20 (1976), 90-114.

"Contraction Semigroups and Trend to Equilibrium in Continuum Mechanics," *Springer Lecture Notes in Math.,* No. 503 (1976), 295-306.

"Almost Periodic Processes and Almost Periodic Solutions of Evolution Equations," *Dynamical Systems,* (A. Bednarek and L. Cesari, Eds.), Academic Press, New York, (1977), 43-57.

"Characteristics in Hyperbolic Conservation Laws: A Study of Asymptotic Behavior of Solutions," *Nonlinear Analysis and Mechanics,* (R.J. Knops, Ed.), *Research Notes in Math.* No. 17, Pitman, London, (1977), 158.

"Generalized Characteristics and the Structure of Solutions of Hyperbolic Conservation Laws," *Indiana Univ. Math. J.,* 26 (1977), 1097-1119.

"Topological Dynamics and the Asymptotic Behavior of Solutions of Evolution Equations," (in Greek) *Greek Mathematical Society Lectures,* 2 (1977), 14-24.

"Asymptotic Behavior of Solutions of Evolution Equations," *Nonlinear Evolution Equations* (M.G. Crandall, Ed.), Academic Press, NY (1978), 103-123.

"Energy Methods for a Class of Nonlinear Hyperbolic Volterra Equations," (with J.A. Nohel), *Communications in Partial Diff. Equations,* 4 (1979), 219-278.

"Stability of Motions of Thermoelastic Fluids," *J. Thermal Stresses,* 2 (1979), 127-134.

"The Second Law of Thermodynamics and Stability," *Arch. Rat. Mech. Analysis,* 70 (1979), 167-179.

"Hyperbolic Balance Laws in Continuum Physics," *Springer Lecture Notes in Physics,* No. 98 (1979), 107-121.

"Asymptotic Behavior of Solutions of Hyperbolic Balance Laws," *Bifurcation Phenom-ena in Math. Physics* (C. Bardos, Ed.), D. Reidel, Dordrecht, (1980), 521-533.

"The Equations of Elasticity are Special," *Trends in Applications of Pure Mathematics to Mechanics,* 3 (R.J. Knops, Ed.), Pitman, London (1981), 96-103.

"Can Dissipation Prevent the Breaking of Waves?" *Trans. 26th Conf. Army Math.* (1981), 187-198.

"A Nonlinear Hyperbolic Volterra Equation in Viscoelasticity," (with J.A. Nohel), *American J. Math.,* Supplement dedicated to P. Hartman (1981), 87-116.

"Conservation Laws with Dissipation," *Nonlinear Phenomena in Mathematical Sciences* (V. Lakshmikantham, Ed.), Academic Press, New York, (1982), 289-294.

"Hyperbolic Systems of Balance Laws with Inhomogeneity and Dissipation," (With L. Hsiao), *Indiana U. Math. J.,* 31 (1982), 471-491.

"Global Smooth Thermomechanical Processes in One-dimensional Nonlinear Thermo-viscoelasticity," (with L. Hsiao), *J. Nonlinear Analysis,* 6 (1982), 435-454.

"Global Smooth Solutions to the Initial boundary Value Problem for the Equations of One-dimensional Nonlinear Thermoviscoelasticity," *SIAM J. Math. Analysis,* 13 (1982), 397-408.

"Adiabatic Shearing of Incompressible Fluids with Temperature Dependent Viscosity," (with L. Hsiao), *Quart. Appl. Math.,* XLI (1983), 45-58.

"Stabilizing Effects of Dissipation," *Proc. EQUADIFF 82, Springer Lecture Notes in Math.,* No. 1017 (1983), 140-147.

"Hyperbolic Systems of Conservation Laws," *Systems of Nonlinear Partial Differential Equations,* (J.M. Ball, Ed.), NATO ASI Series, Series C, No. 111, D. Reidel, Dordrecht (1983), 25-70.

"Discontinuous Thermokinetic Processes," Appendix 4B in *Rational Thermodynamics,* (Second Edition) by C.A. Truesdell, Springer Verlag, New York, (1984), 211-218.

"Conservation Laws Without Convexity," *Springer Lecture Notes in Physics,* No. 195, (1984), 20-24.

"Stabilizing Effects of Dissipation," *Partial Differential Equations and Dynamical Sys-tems,* (W.E. Fitzgibbon, Ed.), *Research Notes in Math* No. 101, Pitman, London, (1984), 5,134-157.

"Large Time Behavior of Solutions of Hyperbolic Balance Laws," *Bull. Greek Math. Soc.,* 25 (1984), 15-29.

"Dissipation Stabilization and the Second Law of Thermodynamics," *Springer Lecture Notes in Physics,* No. 228 (1985), 44-88.

"Regularity and Large Time Behavior of Solutions of a Conservation Law Without Convexity," *Proc. Royal Soc. Edinburgh,* 99A (1985), 201-239.

"Energy Methods for Quasilinear Hyperbolic Initial-boundary Value Problems: Applications to Elastodynamics," (with W.J. Hrusa), *Arch. Rational Mech. Analysis,* 87 (1985), 267-292.

"Dissipation in Materials with Memory," *Viscoelasticity and Rheology* (A. Lodge, J.A. Nohel, and M. Renardy Eds.), Academic Press, New York (1985), 221-234.

"Contemporary Issues in the Dynamic Behavior of Continuous Media," *LCDS Lecture Notes* 851.

"Development of Singularities in the Motion of Materials with Fading Memory," *Arch. Rational Mech. Analysis,* 91 (1986), 193-205.

"Development of Singularities in Solutions of the Equations of Nonlinear Thermoelasticity," (with L. Hsiao), *Quart. Appl. Math.,* XLIV (1986), 463-474.

"Quasilinear Hyperbolic Systems with Involutions," *Arch. Rational Mech. Analysis,* 94 (1986), 373-389.

"Estimates for Conservation Laws with Little Viscosity," *SIAM J. Math. Analysis,* 18 (1987), 409-421.

"Trend to Steady State in a Conservation Law with Spatial Inhomogeneity," *Quart. Appl. Math.,* XLV (1987), 313-319.

"Solutions in Lfor a Conservation Law with Memory," *Analyse Mathematique et Applications,* GauthierVillars, Paris (1988), 117-128.

"Solutions with Shocks for Conservation Laws with Memory," *Amorphous Polymers and Non Newtonian Fluids* (C. Dafermos, J. L. Ericksen, and D. Kinderlehrer, Eds.) Springer Verlag, New York (1987), 33-55.

"Trajectories and Singular Points in Steady-State Models of Two-Phase Flows" (with Z. Bilicki, J. Kestin, G. Majda, and D. L. Zeng), *Int. J. Multiphase Flows,* 13 (1987), 511-533. "Hyperbolic conservation laws with memory", *Differential Equations* (C. Dafermos, G. Ladas and G. Papanicolaou, Eds.) Marcel Dekker, New York, (1989), 157165. 6

"Admissible wave fans in nonlinear hyperbolic systems" *Arch. Rational Mech. Analysis,* 106 (1989), 243-260.

"Generalized characteristics in hyperbolic systems of conservation laws" *Arch. Rational Mech. Analysis* 107 (1989), 127-155.

"Generalized characteristics, uniqueness and regularity of solutions in a hyperbolic system of conservation laws" (with X. Geng), *Analyse non Lin´eaire* 8 (1991), 231-269.

"Generalized characteristics in hyperbolic systems of conservation laws with special coupling" (with X. Geng), *Proc. Royal Soc. Edinburgh*, 116A (1990), 245-278.

"Equivalence of referential and spatial field equations in continuum physics" *Notes on Numerical Fluid Mechanics* 43 (1993), 179-83.

"Large time behavior of solutions of hyperbolic systems of conservation laws with periodic initial data" *J. Diff. Equations* 121 (1995), 183-202.

"Stability for systems of conservation laws in several space dimensions" *SIAM J. Math. Analysis* 26(1995), 1403-1414.

"A system of conservation laws with frictional damping", *Zeit. Ang. Math. Phys.* 46 (1995), S294-S307.

"The vanishing viscosity method in one-dimensional thermoelasticity", (with G.Q. Chen), *Trans. AMS* 347 (1995), 531-541.

"Hyperbolic systems of conservation laws," *Proceedings Int. Congress Math. 1994*, Birkhäuser-Verlag, Basel (1995), 1096-1107.

"Entropy and the stability of classical solutions of hyperbolic systems of conservation laws" *LNM* 1640 (1996), 48-69.

"Entropy for hyperbolic systems of conservation laws in several space dimensions" *AMS/IP Studies in Advanced Math.* 3 (1997), 27-41.

"Global solutions for a system of conservation laws of viscoelastic materials with memory", (with G.Q. Chen), *J. Partial Diff. Eqs.* 10 (1997), 369-383.

"Balance laws in continuum physics" *Advanced Topics in Theoretical Fluid Mechanics*, (J. Malek, J. Necas and M. Rokyta, Eds.), *Pitman Research Notes in Mathematics* No.392, Longman, London (1998), 89–117.

"Genuinely nonlinear hyperbolic systems of two conservation laws" *Contemporary Math.* 238 (1999), 115-126.

"Entropy for hyperbolic conservation laws" in *Entropy*, Chapter 6, (A. Green, G. Keller 7 and G. Warnecke, Eds.), Princeton University Press, 2004.

"Continuous solutions for balance laws" *Ricerche di Matematica,* 55 (2006), 79-91.

"Progress in hyperbolic conservation laws" *Bulletin AMS* (to appear).

"Hyperbolic conservation laws with weak dissipation" *Journal of Hyperbolic Equations*, *3* (2006), 505-527.

"On two-dimensional sonic-subsonic flow" (with G. –Q. Chen, M. Slemrod and D. Wang). *Comm. Math. Phys.,* 271 (2007), 635-637.

"Hyperbolic conservation laws with involutions and contingent entropies" *Proc. Symp. Appl. Math. AMS,* 65 (2007), 193-217.

"Wave fans are special" *Acta Math. Appl. Sinica* **24** (2008), 369-374.

"Global BV solutions for the *p*-system with frictional damping" (with R. Pan). *SIAM J. Math. Anal.* **41** (2009), 1190-1205.

"A variational approach to the Riemann problem for hyperbolic conservation laws" *Discrete and Continuous Dyn. Systems* **23** (2009), 185-195.

"Strong shocks in nonisentropic gas dynamics" *Acta Math. Scientia* **29** (2009), 973-979.
"Generalized characteristics and the Hunter-Saxton equation" *Journal of Hyperbolic Equations* (to appear).

"Maximal dissipation in equations of evolution" (submitted).

Books

Hyperbolic Conservation Laws in Continuum Physics, Springer, Heidelberg, 2000.

Hyperbolic Conservation Laws in Continuum Physics, Tsinghua University Press, Beijing, 2005.

Hyperbolic Conservation Laws in Continuum Physics, Second Edition, Springer, Heidelberg, 2005.

Hyperbolic Conservation Laws in Continuum Physics, Third Edition, Springer, Heidelberg, 2010.

Books Edited

The Breadth and Depth of Continuum Mechanics (with D. D. Joseph and F. M. Leslie). 8 Springer Verlag, New York, 1986.

Oscillation Theory, Computation and Methods of Compensated Compactness (with J. L. Ericksen, D. Kinderlehrer and M. Slemrod). Springer Verlag, New York, 1986.

Dynamical Problems in Continuum Physics (with J. L. Bona, J. L. Ericksen, and D. Kinderlehrer). Springer Verlag, New York, 1987.

Amorphous Polymers and Non Newtonian Fluids (with J. L. Ericksen and D. Kinderlehrer). Springer Verlag, New York, 1987.

Differential Equations (with G. Ladas and G. Papanicolaou). Marcel Dekker, New York, 1989.

Handbook of Differential Equations (with E. Feireisl), Volume I, Elsevier, Amsterdam, 2004.

Handbook of Differential Equations (with E. Feireisl), Volume II, Elsevier, Amsterdam, 2005.

Handbook of Differential Equations (with E. Feireisl), Volume III, Elsevier, Amsterdam, 2006.

Handbook of Differential Equations (with M. Pokorny), Volume IV, Elsevier, Amsterdam, 2008.

Handbook of Differential Equations (with M. Pokorny), Volume V, Elsevier, Amsterdam, 2009.

Invited Lectures 2008

Annual Meeting, American Mathematical Society, San Diego

University of Houston, Department of Mathematics

AIM Workshop, Stanford CA

Meeting, Evolution Equations in Pure and Applied Sciences, Florence Italy

Politecnico di Milano, Department of Mathematics

University of Pittsburgh, Department of Mathematics

HYP 2008, College Park MD

Workshop on Geometric Analysis Elasticity and PDE, Edinburgh Scotland

University of Crete, Department of Mathematics

Meeting on Mechanics and Mathematical Physics, Pisa Italy

Meeting on Hyperbolic Conservation Laws, L'Aquila Italy

Meeting on Nonlinear PDE's, IMPA, Rio de Janeiro Brazil

Workshop on Nonlinear Waves, Oslo Norway

Conference on Nonlinear Phenomena, Fields Institute, Toronto

Carathéodory Symposium, New York

Meeting, Foundation for Research, Greece

Invited Lectures 2009

Meeting on Evolution Equations and Dynamical Systems, Hammamet, Tunisia

Meeting on Nonlinear Evolution Equations, Paris, France

Meeting on Modern Perspectives in Applied Mathematics, New York University

University of California, Irvine, Department of Mathematics

WASCOM 2009, Palermo, Italy

IMA Program on Nonlinear Conservation Laws, Minneapolis

Symposium on Recent Advances in Mechanics, Athens, Greece

Workshop on Conservation Laws, Banff Research Station, Canada

University of Chicago, Department of Mathematics

Invited Lectures 2010

Harold Gay Lecture, Worcester Polytechnic Institute

Short course, University of Parma, Italy 10

University of Padova, Italy, Department of Mathematics

University of Bologna, Italy, Department of Mathematics

International Conference on Nonlinear PDE, Northwestern University

Georgia Institute of Technology, Department of Mathematics

Workshop on PDE, Chinese Academy of Sciences, Beijing, China

International Conference in memory of Wu Xinmou, Beijing, China

Nonlinear PDE's at IMPA, Rio de Janeiro, Brazil

Workshop on Conservation Laws, Seoul National University, Korea

Weizmann Institute, Israel, Department of Mathematics

International Conference on PDE, National University of Singapore

Yeshiva University, Departments of Mathematics and Physics

Service to the Profession in 2010

Editorial Board of following publications:

Quarterly of Applied Mathematics, Associate Managing Editor

Acta Mathematica Scientia, Chief Co-Editor

A*nnali di Matematica Pura ed Applicata*

 Archive for Rational Mechanics and Analysis

Mathematics Applied in Science and Technology

Communications in Applied Analysis

Proceedings of the Royal Society of Edinburgh

Ricerche di Matematica

Revista Matematica Complutense

Bulletin of Greek Mathematical Society

Journal of Dynamics and Differential Equations

Journal of Hyperbolic Differential Equations

Member, Board of Governors and Scientific and Academic Advisory Committee, Weizmann Institute of Science, Israel

Member, National Committee on Research and Technology, Greece

Member, Advisory Board, Institute of Mathematics, Academy of Sciences, Czech Republic

Member, Scientific Advisory Panel, IRIMA, University of Wales, U.K.

Member, Scientific Committee, XIII International Conference on Nonlinear Hyperbolic PDE, Beijing, China

Member, Scientific Committee, XIV International Conference on Nonlinear Hyperbolic PDE, Padova, Italy

Member, Scientific Committee, Workshop, Crete, Greece

Cochairman, Scientific Committee, International Conference in memory of Guoping Li, Wuhan, China

Member, Scientific Committee, EUROCONFERENCES, Crete

Member, Scientific Committee, WASCOM 2011

Member, Institute of Numerical Analysis, Crete, Greece

Honors

Fellow American Academy of Arts and Sciences, 2001-.

Correspondent Member, Academy of Athens, 1988-.

Honorary Professor, Academia Sinica, China, 2004-.

Member, Board of Governors, Weizmann Institute of Science (Israel), 1995-.

Fellow, SIAM, 2009 –

Fellow, Society of Scholars, Johns Hopkins University.

Chairman, Society for Natural Philosophy, 1977-78.

Secretary, International Society for the Interaction of Mathematics and Mechanics, 1984-86.

Ordway Chair, University of Minnesota, 1985.

Keeley Fellowship, Wadham College, Oxford, 2001.

Honorary Doctorate, University of Athens, 1987.

Honorary Doctorate, National Technical University (Greece), 1991.

Honorary Doctorate, University of Crete, 2001.

SIAM W.T. and Idalia Reid Prize, 2000.

Services to Brown University

1971-73, Sc.B. Concentration Adviser

1973-76, Member, Graduate Program Committee, Division of Applied Mathematics

1976-77, Member, Graduate Council

1979-81, Member, Faculty Policy Group

1982-84, Member, ACUP

1982-84, Member, Executive Committee, Division of Applied Mathematics

1986-88, Member, Executive Committee, Division of Applied Mathematics

1988-93, Director, Lefschetz Center for Dynamical Systems

1991-92, Member, Executive Committee, Division of Applied Mathematics

1993-98, Member, Executive Committee, Division of Applied Mathematics

1994-95, Graduate Representative, Division of Applied Mathematics

1995-99, Member, Graduate Program Committee, Division of Applied Mathematics

1995- Member, Advisory Committee on Modern Greek Studies

2003-05, Graduate Representative, Division of Applied Mathematics

2006-09, Member, Committee on Grievance

2002-03, Freshman Adviser

2006-08, Freshman Adviser

2006-07, Director, Lefschetz Center for Dynamical Systems

2007-10, College Curriculum Council

2008- Chair, Graduate Program, Division of Applied Mathematics

Research in Progress

Dissipative Mechanisms in Nonlinear Analysis and Mechanics

Hyperbolic Conservation Laws

Teaching

1974-75 AM 233, 234, 33
1975-76 AM 223, 224, 291, 292
1976-77 AM 219, 291, 34, 292
1977-78 Sabbatic Leave
1978-79 AM 211, 212, 219, 291, 292
1979-80 AM 223, 224, 291, 292
1980-81 AM 33, 34, 291, 292
1981-82 AM 33, 34, 291, 292
1982-83 AM 219, 221, 291, 292
1983-84 AM 223, 224, 291, 292
1984-85 Sabbatic Leave
1985-86 AM 35, 291, 292, MA 111

1986-87 AM 219, 291, 220, 292
1987-88 AM 223, 291, 224, 292
1988-89 AM 291, 36, 212, 292
1989-90 AM 223, 291, 224, 292
1990-91 AM 33, 281, 34, 282
1991-92 AM 211, 291, 212, 282
1992-93 AM 219, 291 – Sabbatic Leave
1993-94 AM 223, 224, 36, 291, 292
1994-95 AM 33, 34, 291, 292
1995-96 AM 223, 224, 291, 292
1996-97 AM 33, 34 14
1997-98 AM 36, 224
1998-99 AM 36, 212
1999-00 AM 35, 36
2000-01 AM 211, Math 221 – Sabbatic Leave
2001-02 AM 34, 224
2002-03 AM 33, 211, 291, 292
2003-04 AM 223, 224, 291, 292
2004-05 AM 211, 282
2005-06 Sabbatic Leave – AM 33
2006-07 AM 35, 282
2007-08 APMA 2230, 2240
2008-09 APMA 2110, 2120
2009-10 APMA 0330
2010-2011 APMA 0360, 2120

Direction of Ph.D. Theses

1971, Frederick Bloom

1971, Lewis Leibovich

1972, Sarp Adali

1977, Rouben Rostamian

1979, Reza Malek Madani

1980, Kim Lyons

1981, Kim Jong U

1982, William Hrusa

1985, Jose Luiz Boldrini

1985, Scott McIntire

1985, Athansios Tzavaras

1989, Athanasios Lyberopoulos

1992, Michael Hilgers

1994, Rustum Choksi

1994, Daniel Ostrov

1996, Konstantina Trivisa

2004, Cleopatra Christoforou

2009, Charis Tsikkou