January, 2012

Chau-Hsing Su
Professor Applied Mathematics
Division of Applied Mathematics

Educational Background

B.S. (1956) National Taiwan University

M.S. (1959) University of Minnesota

Ph.D. (1964) Princeton University
Thesis: "Kinetic theory of a weakly coupled gas"

Professional Appointments

1963–64 Research Associate, Massachusetts Institute of Technology

1964–66 Assistant Professor and Ford Fellow, Massachusetts Institute of Technology

1965–66 Consultant to Bell Telephone

1966–67 Research Fellowship, Princeton University, Plasma Physics Laboratory

1967–76 Associate Professor of Applied Mathematics, Brown University

1973–74 Senior Fellowship, National Center for Atmospheric Research, Boulder, CO

1976 Professor of Applied Mathematics, Brown University

1981 (Spring term), Visiting Professor, Beijing University, Beijing, China

1985 Consultant to D.H. Wagner Associates, Yorktown, VA

1987 Visiting Professor, Institut de Mechanique de Grenoble, Joseph Fourier University, Grenoble, France

2007 Visiting Professor, Beijing University, Beijing, China

List of Publications

(Refereed Journal Articles)

"Variational Principle in Plasma Dynamics," Physics of Fluids 4 (1961), p. 1376.

"The Continuum Theory of Spherical Electrostatic Probes" (with S.H. Lam), Physics of Fluids 6 (1963), p. 1479.

"The Kinetic Theory of Classical Boltzmann Gases," Physics of Fluids 7 (1964), p. 1248.

"Compressible Plasma Flow Over a Biased Body," AIAA 3 (1964), p. 842.

"Kinetic Theory of a Weakly Coupled Gas, Journal of Mathematical Physics" 5 (1964), p. 1273.

"Linearized Near-Free Molecule Couette Flow," Physics of Fluids 7 (1964), p. 1867. Research Note.

"Comments on Weak-coupling Version of Bogoliubov's Kinetic Theory of Gases," Physics of Fluids 7 (1964), p. 2022.

"A Kinetic Theory Approach of the Electrostatic Probes," Physics of Fluids, January 1964 (with E. Wasserstrom and R.F. Probstein).

"Some Remarks on Plasma Oscillations and Kinetic Theory of Plasmas," Physics of Fluids 8 (1965), p. 1115.

"Eigenvalue Problem of the Fokker-Planck Collision Integral," Proceedings of the 7th International Conference on Phenomena in Ionized Gases, August 1965.

"Theory of Parametric Coupling in Plasmas," Physical Reviews 152 (1966), p. 129–135 (with Y.C. Lee).

"Continuum Theory of Electrostatic Probes," Journal of Applied Physics 37 (1966), p. 4907 (with R.E. Kiel).

"Theory of an Electrostatic Probe in a Moderately Ionized Gas," Physics of Fluids 10, p. 124 (with A.A. Sonin).

"Theory of Linear Fokker–Planck Collision Operator," Journal of Mathematical Physics 8 (1967), p. 248.

"A Survey of Phenomena in Ionized Gases," International Atomic Energy Agency Vienna.

"Collisional Damping of a Plasma Echo," Physical Reviews Letters 20 (1968), p. 427 (with C. Oberman).

"Nonlinear Interaction of ElectromagneticWaves in a Magnetized Plasma," Physics of Fluids 11 (1963), p. 1778.

"Kortweg-deVries Equation and Generalizations IV. Derivation of the Kortweg-deVries Equation and Burgers Equation," Journal of Mathematical Physics 10 (1969), p. 536 (with C. Gardner).

"Boltzmann Equation with Power Law Interparticle Potentials," Physics of Fluids 12 (1969), p. 552 (with Young–ping Pao).

"Linear Instability of Some Finite Amplitude Ion Waves," Physics of Fluids 13 (1970), p. 1275.

Comments on "Nonlinear Interaction of ElectromagneticWaves in a ColeMagnetized Plasma," Physics of Fluids 13 (1970), p. 1420.

"One the Instability of Certain Nonlinear Period Waves: Journal of Mathematics and Mechanics," 19 (1970), p. 953 (with Young–ping Pao).

"Theory of Continuum Flush Probes," Physics of Fluids 14 (1971), p. 1366 (with Neil Stahl). Comments on "Ion Wave Excitations and Ion Sheath Evolution," Physics of Fluids 14 (1971), p. 1817.

"System of Vortices in a Rotating Liquid Helium," Physics of Fluids 16 (1973), p. 182.

"One-dimensional Migration Models in Population Genetics Theory," Theoretical Population Genetics, 5 (1974), p. 431 (with W.H. Fleming).

"A Report on Steady, Two–dimensional Stratified Flows," The National Center for Atmospheric Research, Boulder, CO (1974) (with P.G. Drazin and J.D. Lee).

"A Note on Longwave Theory of Airflow over a Mountain," Journal of Atmospheric Sciences 32 (1975), p. 437 (with P. G. Drazin).

"Some Dissipative Effects in Stratified Shear Flows over an Obstacle," Physics of Fluids 18 (1975), p. 1081.

"Hydraulic Jumps in a Stratified Shear Flow," Journal of Fluid Mechanics, 73, 1, (1976), p. 33–47.

"Stability of the Budyko Climate Model," with D.Y. Hsieh, Journal of Atmospheric Science 12 (Dec. 1976), p. 2273–2775.

"A Numerical Method for Stratified Shear Flow over a 82 (1977), p. 420–425.

"Nonlinear Theory of the Critical Layer in a Stratified Flow," (with S. Margolis), Phys. of Fluids, 21, 1247–1259 (1978).

"Compressible Stratified Flows over a Long Obstacle," (with William Stevens), Phys. of Fluids, 22, 1428–34 (1979).

"Motion of Fluid with Constant Voracity in a Singly–connected Region," Phys. of Fluids, 22, 2032–33 (1979).

"One Head-on Collisions Between Two Solitary Waves" (with R.M. Mirie), J. Fluid Mech., 98, 509–525 (1980).

"Nonlinear Water Waves". Lecture notes published by the Department of Mechanics, Beijing University, Beijing, China, 185 pages (May 1981).

"Stratified Flows". Lecture notes published by the Department of Mechanics, Beijing University, Beijing, China, 170 pages (June 1981).

"Collisions Between Solitary Waves II - A Numerical Study" (with R.M. Mirie), Journal of Fluid Mechanics 115, p. 475–492 (1982).

"Three-dimensional Steady Stratified Flows - A Numerical Approach," (with W.K. Stevens), Journal Computational Phys. 46, 397–422 (1982).

"An Evolution for a Stratified Flow Having Two Characteristics in Coalescence". Advances in Nonlinear Waves, Ed. L. Debnath, Pitman Publishing, Inc., Boston (1984).

"Internal Solitary Waves and Their Head-on Collision" (I), (with R.M. Mirie), Journal of Fluid Mechanics, 147, 123 (1984).

"Higher Order Approximations of a Solitary Wave," (with Steve Pennell), Journal of Fluid Mechanics, 149, 431–443 (1984).

"Internal Solitary Waves and Their Head-on Collision (II)," (with R.M. Mirie), Physics of Fluids 29, 31 (1986).

"High Order Calculation of Over Taking Collisions Between Two SolitaryWaves," (with Qisu Zou), Physics of Fluids 29, 2113 (1986)
.
"Waves Generated by Collisions of Solitary Waves," (with Qisu Zou), in Phys. Rev. A. 35

4738 (June 1987).

"Flow-induced Vibrations of Non-linear Cables, Part I:Models and Algorithms", (with C. Evangelinos, D. Lucor and G. E. Karniadakis), International J. Num. Meth. Fluids, 55, 535-556 (2002).

"Stochastic Modeling of Flow-structure Interactions using Generalized Polynomial Chaos", (with D. Xiu, D. Lucor and G. E. Karniadakis), J. Fluids Eng., 124, 51-59 (2002).

"Spectral Polynomial Chaos Solutions of the Stochastic Advection Equation", (with M. Jardak and G. E. Karniadakis), J. Sci. Comp., 17, 319-339 (2002).

"Predictability and Uncertainty in CFD" (with D. Lucor, D. Xiu, G. Karniadakis), Int. J. Num. Meth. Fluid, 43(5), 483-505 (2003).

"The Stochastic Piston Problem" (with G. Lin and G.E. Karniadakis), Proc. National Academy of Sciences, 101, 15840-15845 (2004).

"Generalized Polynmial Chaos and Random Oscillators" (with D. Lucor and G.E. Karniadakis), Int. J. Num. Meth. Eng., 60(3), 571-596 (2004).

"Kernel representations of multidimensional second-order stochastic processes" (with D. Lucor), Journal of Computational Physics, 217, 82-99, September (2006).

"Predicting shock dynamics in Uncertainty Quantification," (with G. Lin and G.E. Karniadakis), Journal of Computational Physics, 217, 260-276, September (2006).

"Random Roughness Enhances Lift in Supersonic Flow," (with G. Lin and G.E. Karniadakis), Phys. Rev. Letts. 99, 104051 (2007).

Invited Speaker of International Conference on Phenomena in Ionized Gases, Vienna (1968).

Invited Lecturer on "SolitaryWaves" and "Stratified Flows," Peking University, China (1981).

University of Illinois at Chicago Circle, "Collisions of Solitary Waves" (1982).

Courant Institute of Mathematical Sciences (1982), "Numerical Studies of Collisions between Solitary Waves".

Invited Speaker of the National Science Foundation regional conference on "Nonlinear Waves and Integrable Systems," Greenville, NC (1982).

Contribution to a Monograph entitled "Advances in Nonlinear Waves," Pitman Advanced

Publishing Program (1984).

Invited Speaker at the Annual Meeting of the Society of Engineering Science, University of Delaware (1983), "Head-on Collisions for Internal Solitary Waves".

Chairman for a mini-symposium on "Solitary Waves," SIAM Summer meeting, Seattle (1984).

Invited Speaker for "Nonlinear Waves"
a. Institute of Math. Academic Sinica, Taiwan, July 1984.
b. Hong Kong Polytechnics, Hong Kong, July, 1984.
c. Hua Chiao University, Fujian, China, August 1984.
d. Peking University, Beijing, China, August 1984.
e. Institute of Oceanology, Academic Sinica, China, August 1984.

Invited speaker at the University of Petroleum and Minerals, Saudi Arabia, March, 1984.

Invited speaker on Symposium of Fluid Dynamics at the University of Michigan, Ann Arbor (1985), "Collisions of Solitary Waves".

University of Lowell, "Waves generated due to interaction of two solitary waves," Lowell, Massachusetts, March 1986.

Series of lecture on a numerical method on water waves. Institut de Mechanique, Grenoble, France (1988).

Department of Mechanics, Tianjin University, China. Series of lecture on "Numerical Solution for Waves on a Free Surface". (1988).

Institute of Applied Mathematics and Mechanics, Shanghai Technical University "Interactions between solitary waves - numerical and analytical method". (1988).

Distinguished Scholars Lecture Series, California State University at Long Beach, March 1989.

Colloquium at Caltech, Div. of Engineering Sciences, Pasadena, California, March 30, 1989.

American Math Society regional meeting, Invited speaker on "Numerical Method on Water Wave Problem," March 1990.

University of Lowell, Dept. of Mathematics Colloquium, Dec. 1990.

ONR Workshop on Flow/Wave-Structure Interactions, June 1997.

Invited Speaker on "Solitary Waves and their Interaction"

a. Hongkong Science and Technology University, January 1998.
b. Hong Kong University, January 1998.
c. Chungyuang University, Taiwan, January 1998.

Seminar speaker at Mathematics Department, Monash University, Melbourne, "Surface Waves Generated by a Moving Submerged Body", 2001.

Seminar speaker at Mechanical Engineering Department, Monash University (2001), "Flow-induced Vibrations of a Nonlinear Cable."

Seminar speaker at International Conference on Computational Science, Krakow, Poland, June 6-9, 2004, "Karhunen-Loeve representation of periodic second-order autoregressive process," (with D. Lucor and G.E. Karniadakis).

Seminar Speaker at Tsinghua University, Beijing China (November 2007).
(a) "Spatial radom processes"
(b) "Waves in human arteries"

Seminar Speaker at the University of Paris 6 (November 2008)
"Wave Scattering by a random medium"

Work in Progress

1. Waves in human arteries

2. Scattering of waves by random media

3. Potenial flows over an array of cylinders

Research Grants

a. Bell Telephone Laboratories on Plasma Physics, 1958-69

b. ARAP Laboratory for Material Research, Brown University, 1971-73

c. NSF Atmospheric Science 1975-77

d. NSF Fluid Mechanics, 1977-82

e. Office of Naval Research, 1976-84

f. NASA graduate Fellowship for Mr. Nicasio Sepulveda, 1985-86

g. NSF (with George Karniadakis) Generalized Polynomial Chaos, 2002-2005

Academic Honors

Ford Fellowship, MIT., 1964–66

Senior Fellowship, National Center for Atmospheric Research, 1973–74

Teaching (in last three years)

AM133, AM34 2008-2009

AM133, AM34 2009-2010

AM34 2010-2011