

Bernard D. Coleman
 J. Willard Gibbs Professor of Thermomechanics
 Rutgers University

Degrees: B.S., Cum Laude, Indiana University, 1951
 M.S., Yale University, 1952
 Ph.D., Yale University, 1954

Recent Honors and Awards:

1984 Bingham Medal of the Society of Rheology
 1991 Fourth Annual Aris Phillips Memorial Lecture, Yale University
 1993 Honorary Doctorate (Laurea Honoris Causa in Mechanica Arte),
 University of Rome.
 1996 The Editors of the *Journal of Polymer Science* selected, for reprinting
 with commentaries, the paper "General Theory of Stationary Random
 Sequences with Applications to the Tacticity of Polymers" [*J. Polym.*
 Sci., **A1**, 3183-3196 (1963)] by B.D. Coleman and T.G Fox as one of
 the "most important and influential" articles to appear in the Journal
 during its first 50 years.
 2002 Elected to the College of Fellows of the American Institute for Medical
 and Biological Engineering (AIBME).
 2002 Appointed Honorary Member of the International Society for the
 Interaction of Mathematics with Mechanics (ISIMM) "in recognition of
 outstanding achievements in the field of Applied Mathematics and
 Thermodynamics".

Research Interests:

The mathematical sciences in general, with particular emphasis on continuum mechanics, functional analysis, the thermodynamics of materials with memory, materials science, solid state physics, functional analysis, and such topics in biophysics as DNA topology, DNA elasticity, and theories of DNA-protein interactions.

Former Principal Positions:

- (1) Graduate Research Fellowship, Yale University, 1951 - 1954.
- (2) Research Chemist at the Carothers Research Laboratory of the du Pont Company, 1954 - 1957.
- (3) Senior Fellow of the Mellon Institute, 1957 - 1988.
- (4) Professor of Mathematics at Carnegie Mellon University, 1967 - 1988.
- (5) Professor of Biology at Carnegie Mellon University, 1974 - 1988.

- (6) Professor of Chemistry at Carnegie Mellon University, 1984 - 1988.

Present Principal Positions

- (1) J. Willard Gibbs Professor of Thermomechanics, Rutgers University, July 1988 — .
- (2) Professor of Mathematics, Rutgers University, July 1988 — .
- (3) Graduate Director, Program in Mechanics, Rutgers University, July 1991—.
- (4) Member, Center for Molecular Biophysics and Biophysical Chemistry, June 1997 — .

Other Appointments:

- (1) Visitor at the Istituto Matematico, Università di Bologna, Italy, September 1960 - July 1961.
- (2) Visiting Professor in the Department of Mechanics of the Johns Hopkins University, September 1962 - February 1963.
- (3) Visiting Professor and Consultant in the Department of Aeronautics and Astronautics of the University of Washington, June - August 1964, June - August 1967, August 1968, and July 1972.
- (4) Adjunct Professor in the Department of Mechanical Engineering of the University of Pittsburgh, September 1964 - May 1965.
- (5) Lecturer at the Centro Internazionale Matematico Estivo, Bressanone, Italy, July 1963 and June 1965.
- (6) Speaker, Midwest Mechanics Seminar Tour (five universities), October 1965.
- (7) Visiting Lecturer for the month of May 1965 in the Department of Mathematics of the University of Manchester, England.
- (8) Visiting Professor at the Istituto Matematico, Università di Pisa, Italy, May 1966, May - June 1968, October 1969, and June 1974.
- (9) Lecturer at the Summer Program in mathematics of the Scuola Normale Superiore, Pisa, Italy, September 1969 and August - September 1970.

- (10) Lecturer at the Summer Course on Thermodynamics, International Centre for Mechanical Sciences, Udine, 1971.
- (11) Visiting Professor for the month of November 1972 and Invited Participant in the Symposium on Continuum Mechanics and Partial Differential Equations, August 1977, at the Instituto di Matematica, Universidade Federal do Rio de Janeiro, Guanabara, Brazil.
- (12) Visiting Professor for the month of May 1973 at the Istituto Matematico, Università di Genova, Italy.
- (13) Visiting Professor at the International Centre for Mechanical Sciences, Udine, October 1973 (course of 10 lectures, entitled "Modern Rheology: Theory and Applications").
- (14) Visiting Professor of Mathematical Biology at the Pymatuning Laboratory of Ecology, operated by the University of Pittsburgh, at Linesville, Pennsylvania, June - July 1977 (course of 8 lectures entitled "Mathematical Problems in Ecology").
- (15) Visiting Professor and Consultant, National Bureau of Standards, Washington, D.C., May and June 1981; June and July 1982.
- (16) Visiting Professor in the Department of Engineering Mechanics, University of Missouri-Rolla, October 3 - 11, 1981.
- (17) Lecturer at the Centro Internazionale Matematico Estivo, Noto, Sicily, June 22 - July 3, 1982 (course of 8 lectures on "Thermodynamics and Constitutive Equations").
- (18) Visiting Professor at the Istituto Matematico, Università di Ferrara, Italy, July 1982, October 1983.
- (19) External Examiner, University of Ibadan, Nigeria, June 11 - 21, 1982.
- (20) Invited short courses (series of two or more lectures): Université de Poitiers, October 1973; Universität Dortmund, May 1975; Technische Universität, Berlin, June 1975; Heriot-Watt University, Edinburgh, January 1977; Max-Planck-Institut, Tübingen, January 1977; Università di Pisa, January 1981; Università di Trento, January 1981; Cornell University, February 1981; University of Ibadan, June 1982; Universities of Salerno and Naples, July 1982, June 1986, December 1987; Università di Palermo, October 1983; Mathematics Research Center, University of Wisconsin, March 1984; Heriot-Watt University, January 1986; Università di Bologna, June 1986; Università di Roma II, June and October 1989, January 1991; Università di Torino, June 1989; Ecole Normale Supérieure de Cachan, visits of approximately one week in November 1991, January 1992, January, 1994; Ecole Nationale des Ingenieurs de Tunis, January and May, 1991; Carnegie Mellon University, February and May, 1993.
- (21) Visiting Professor at the Institute for Mathematics and its Applications, University of Minnesota, and Lecturer at the Symposium on Orientation in

- Polymers and the Workshop on the Laws and Structures of Continuum Thermomechanics, January, May, and June 1983.
- (22) Visiting Professor at the International Centre for Mechanical Sciences, Udine, September 1983 (Course of 10 lectures on Photoviscoelasticity).
- (23) Visiting Professor at the Department of Theoretical and Applied Mechanics, Cornell University, Ithaca, May 1985, August 1986.
- (24) Lecturer at the 13th Summer School on Mathematical Physics, Villa Rufolo, Ravello, September 1988 (course of 5 lectures on "Mechanical Hysteresis").
- (25) Lecturer at the Symposium on Heat Waves and Second Sound and the Workshop on Nonlinear Evolution Equations that Change Type, Institute for Mathematics and its Applications, University of Minnesota, January and March 1989.
- (26) Visiting Professor at the Dipartimento di Ingegneria Strutturale, Università di Roma "La Sapienza", May and June 1989 (course of 10 lectures on "Modern Continuum Mechanics")
- (27) Visiting Professor at the Laboratoire de Minéralogie-Cristallographie à l'Université de Paris VI, March and April 1995.
- (28) Visiting Professor at the Centre de Mathématiques et de Leurs Applications, Ecole Normale Supérieure, Cachan, France, May 1995.

Editorial, Administrative, and Advisory Activities:

Member of the Editorial Board of the Archive for Rational Mechanics and Analysis, 1962 - 2000.

Member of the Editorial Board of the Journal of Mathematical Biology, September 1975 - 2000.

Editor-in-Chief of the Springer Tracts in Natural Philosophy, 1967 - 1973.

Treasurer of the Society for Natural Philosophy, 1967 and 1968.

Chairman of the Society for Natural Philosophy, 1971 and 1972.

Carnegie Mellon University

Faculty Senate, 1972 - 1974.

Mellon Institute of Science College Council, 1974 - 1976.

Member of the Board of Directors of the Renaissance and Baroque Society of Pittsburgh, September 1974 - September 1979.

Member of the following Graduate Programs of Rutgers University, 1988 to date: Mechanics, Mathematics, Materials Science, and Graduate Program in Biomedical Engineering (2001 to date)

Graduate Director of the Program in Mechanics of Rutgers University, July 1991 to date.

Co-editor of the book, "Analysis and Continuum Mechanics," A Collection of Papers Dedicated to J. Serrin (1989).

Member, Mason Gross Lecture Series Selection Committee, Rutgers University, 1994 - 1997.

Member of Executive Committee of The International Society for the Interaction of Mechanics and Mathematics, 1995 - 1999.

Member of the Center for Molecular Biophysics and Biophysical Chemistry, Rutgers University, 1997 to date.

Member, Howard Hughes Educational Advisory Committee, Rutgers University, 1997 to 2000.

Conferences Organized:

Member of the Program Committee for the National Meeting of the Society of Rheology, 1973.

American chairman for the Symposium on Non-Linear Continuum Mechanics held in Venice, May 1978, and sponsored by the U.S – Italy Cooperative Science Program.

Organized the First Rutgers Conference on Theoretical Mechanics, New Brunswick, 24 - 27 August 1990.

Organized the Second Rutgers Conference on Theoretical Mechanics, New Brunswick, 12 - 15 October 1991.

Co-organizer of the Workshop on Material Instabilities for the Institute for Mechanics of Materials, held at Davis, California, 7-8 October 1995.

Co-organizer of the Workshop on DNA Topology, Rutgers, Busch Campus, 3,4 April 1997.

Co-organizer of the International Meeting on Mathematics and Mechanics in Materials Science and Molecular Biology, held at the Centro Congressi, Capri, 18-20 June 1997.

Organizer of the Workshop on Bifurcation Analysis of Rodlike Structures and Applications in Biophysics, Rutgers, Busch Campus, 25,26 October 2005.

Honors:

Keynote Speaker, Twelfth Southeastern Conference on Theoretical and Applied Mechanics, May 1984.

Invited Lecturer at the Symposium on Viscoelasticity and Rheology, at the Mathematics Research Center, University of Wisconsin, October 1984.

Invited Lecturer at the Centennial of the Circolo Matematico di Palermo, October 1984.

Awarded the Bingham Medal of the Society of Rheology, 1984.

Invited Lecturer at the Symposium on Continuum Models of Phase Transformations, Heriot-Watt University, Edinburgh, January 1986.

Invited Lecturer at the Interdisciplinary Symposium on Macroscopic Theories of Superfluids, at the Accademia Nazionale dei Lincei, Rome, May 1986.

Invited Lecturer at the Workshop on Fracture in Polymers and Metals, at the Mathematical Sciences Institute, Cornell University, Ithaca, August 1986.

In the January 13, 1986, issue of Current Contents, the Institute for Scientific Information featured the following article by B.D. Coleman and W. Noll as a "citation classic": "An Approximation Theorem for Functionals, with Applications in Continuum Mechanics," *Archive for Rational Mechanics and Analysis*, **6**, 355-370 (1960). In the October 22, 1990, issue, the following two articles were also so featured: B. D. Coleman and W. Noll, "The Thermodynamics of Elastic Materials with Heat Conduction and Viscosity," *Archive for Rational Mechanics and Analysis*, **13**, 167-178 (1963); B. D. Coleman, "Thermodynamics of Materials with Memory," *ibid.* **17**, 1-46 (1964).

Invited Lecturer at the Symposium on Constitutive Modeling for Nontraditional Materials, ASME Winter Annual Meeting, Boston, December 1987.

Invited Lecturer, 13th Summer School on Mathematical Physics, Ravello, September 1988.

The Science Citation Index listed the paper "Foundations of Linear Viscoelasticity" by B.D. Coleman and W. Noll as among the 100 most cited papers in the *Reviews of Modern Physics* for the period 1955 - 1986.

In 1996, on the occasion of the 50th anniversary of the founding of the *Journal of Polymer Science*, the Editors published with commentaries, 17 papers selected by a board of review as among the "most important and influential" appearing in the *Journal* during its first 50 years. Among the papers to be so reprinted is the article, "General Theory of Stationary Random Sequences with Applications to the Tacticity of Polymers," by B. D. Coleman and T. G Fox, which appeared in Vol. A1, pp. 3183-3196 (1963).

Invited Lecturer at the Meeting on Rational Mechanics and Analysis in honor of Clifford Truesdell, Pisa, May 1989.

Invited Lecturer at the International Conference on Waves and Stability in Continuous Media, Sorrento, October 1989.

Invited Lecturer at the Workshop on Defects, Singularities, and Patterns in Nematic Liquid Crystals, Orsay, May 1990.

Delivered the Fourth Annual Aris Phillips Memorial Lecture at Yale University in March 1991. Title of lecture: "On the Role of Thermodynamics in Continuum Mechanics".

Honorary Doctorate (Laurea Honoris Causa in Mechanica Arte), University of Rome. October 1993

The Editors of the *Journal of Polymer Science* selected, for reprinting with commentaries, the paper "General Theory of Stationary Random Sequences with Applications to the Tacticity of Polymers" [*J. Polym. Sci.*, **A1**, 3183-3196 (1963)] by B.D. Coleman and T.G Fox as one of the "most important and influential" articles to appear in the *Journal* during its first 50 years, 1996.

Elected to the College of Fellows of the American Institute for Medical and Biological Engineering (AIBME), March 2002.

Appointed Honorary Member of the International Society for the Interaction of Mathematics with Mechanics (ISIMM) "in recognition of outstanding achievements in the field of Applied Mathematics and Thermodynamics", October 2002.

Published Works of Bernard D. Coleman

A. Scientific Papers :

- (1) B.D. Coleman and R.M. Fuoss, Quaternization Kinetics. I. Some Pyridine Derivatives in Tetramethylene Sulfone, *J. Am. Chem. Soc.* **77**, 5472-5476 (1955).
- (2) S.N. Timasheff, H.M. Dintzis, J.G. Kirkwood, and B.D. Coleman Studies of Molecular Interactions in Isoionic Protein Solutions by Light-Scattering, *Proc. National Acad. Sci.* **41**, 710-714 (1955).
- (3) B.D. Coleman, Time Dependence of Mechanical Breakdown Phenomena, *J. Appl. Phys.* **27**, 862-866 (1956).
- (4) B.D. Coleman, Application of the Theory of Absolute Reaction Rates to the Creep Failure of Polymeric Filaments, *J. Polymer Sci.* **20**, 447-455 (1956).
- (5) B.D. Coleman, S.N. Timasheff, H.M. Dintzis, and J.G. Kirkwood, Light-Scattering Investigation of Charge Fluctuations in Isoionic Serum Albumin Solutions, *J. Am. Chem. Soc.* **79**, 782-791 (1957).
- (6) B.D. Coleman, A Stochastic Process Model for Mechanical Breakdown, *Trans. Soc. Rheology* **1**, 153-168 (1957).
- (7) B.D. Coleman and A.G. Knox, The Interpretation of Creep Failure in Textile Fibers as a Rate Process, *Textile Res. J.* **27**, 393-399 (1957).
- (8) B.D. Coleman, Time Dependence of Mechanical Breakdown in Bundles of Fibers. I. Constant Total Load, *J. Appl. Phys.* **28**, 1058-1064 (1957).
- (9) B.D. Coleman, On the Properties of Polymers with Random Stereo-Sequences, *J. Polymer Sci.* **31**, 155-164 (1958).
- (10) B.D. Coleman and D.W. Marquardt, Time Dependence of Mechanical Breakdown in Bundles of Fibers. II. The Infinite Ideal Bundle Under Linearly Increasing Loads, *J. Appl. Phys.* **29**, 1065-1067 (1958).
- (11) B.D. Coleman, Time Dependence of Mechanical Breakdown in Bundles of Fibers. III. The Power Law Breakdown Rule, *Trans. Soc. Rheology* **2**, 153-168 (1958).
- (12) B.D. Coleman and D.W. Marquardt, Time Dependence of Mechanical Breakdown in Bundles of Fibers. IV. The Infinite Ideal Bundle Under Oscillating Loads, *J. Appl. Phys.* **29**, 1091-1099 (1958).

- (13) B.D. Coleman, The Statistics and Time Dependence of Mechanical Breakdown in Fibers, *J. Appl. Phys.* **29**, 968-983 (1958).
- (14) B.D. Coleman, On the Strength of Classical Fibers and Fiber Bundles, *J. Mech. Phys. Solids* **7**, 60-70 (1958).
- (15) B.D. Coleman, A.G. Knox, and W.F. McDevit, The Effect of Temperature on the Rate of Creep Failure for 66 Nylon, *Textile Res. J.* **28**, 393-399 (1958).
- (16) B. D. Coleman and W. Noll, Conditions for Equilibrium at Negative Absolute Temperatures, *Phys. Rev.* **115**, 262-265 (1959).
- (17) B.D. Coleman, Time Dependence of Mechanical Breakdown in Bundles of Fibers. V. Fibers of Class A-2, *J. Appl. Phys.* **30**, 720-724 (1959).
- (18) B.D. Coleman and W. Noll, On Certain Steady Flows of General Fluids, *Arch. Rational Mech. Anal.* **3**, 289-303 (1959).
- (19) B.D. Coleman and W. Noll, On the Thermostatistics of Continuous Media, *Arch. Rational Mech. Anal.* **4**, 97-128 (1959).
- (20) B.D. Coleman and W. Noll, Helical Flow of General Fluids, *J. Appl. Phys.* **30**, 1508-1512 (1959).
- (21) B.D. Coleman and S.N. Timasheff, On Light-Scattering Studies of Isoionic Proteins, *Arch. Biochem. & Biophys.* **87**, 63-69 (1960).
- (22) B.D. Coleman and C. Truesdell, On the Reciprocal Relations of Onsager, *J. Chem. Phys.* **33**, 28-31 (1960).
- (23) B.D. Coleman, R.M. Fuoss, and M. Watanabe, Quaternization Kinetics of Poly-4-Vinylpyridine, *J. Polymer Sci.* **38**, 5-15 (1960).
- (24) B.D. Coleman and W. Noll, An Approximation Theorem for Functionals, with Applications in Continuum Mechanics, *Arch. Rational Mech. Anal.* **6**, 355-370 (1960).
- (25) B.D. Coleman and W. Noll, Recent Results in the Continuum Theory of Viscoelastic Fluids, *Annals New York Acad. Sciences* **89**, 672-714 (1961).
- (26) B.D. Coleman and W. Noll, Foundations of Linear Viscoelasticity, *Rev. Modern Phys.* **33**, 239-249 (1961).
- (27) B.D. Coleman and W. Noll, Normal Stresses in Second-Order Viscoelasticity, *Trans. Soc. Rheology* **5**, 41-46 (1961).

- (28) B.D. Coleman, Mechanical and Thermodynamical Admissibility of Stress-Strain Functions, *Arch. Rational Mech. Anal.* **9**, 172-186 (1962).
- (29) B.D. Coleman, Kinematical Concepts with Applications in the Mechanics and Thermodynamics of Incompressible Viscoelastic Fluids, *Arch. Rational Mech. Anal.* **9**, 273-300 (1962).
- (30) B.D. Coleman, Substantially Stagnant Motions, *Trans. Soc. Rheology* **6**, 293-300 (1962).
- (31) B.D. Coleman and W. Noll, Steady Extension of Incompressible Simple Fluids, *Phys. Fluids* **5**, 840-843 (1962).
- (32) B.D. Coleman and W. Noll, The Thermodynamics of Elastic Materials with Heat Conduction and Viscosity, *Arch. Rational Mech. Anal.* **13**, 167-178 (1963).
- (33) B.D. Coleman and V.J. Mizel, Thermodynamics and Departures from Fourier's Law of Heat Conduction, *Arch. Rational Mech. Anal.* **13**, 245-261 (1963).
- (34) L.E. Bragg and B.D. Coleman, On Strain Energy Functions for Isotropic Elastic Materials, *J. Math. Phys.* **4**, 424-426 (1963).
- (35) L.E. Bragg and B.D. Coleman, A Thermodynamical Limitation on Compressibility, *J. Math. Phys.* **4**, 1074-1077 (1963).
- (36) B.D. Coleman and T.G. Fox, General Theory of Stationary Random Sequences with Applications to the Tacticity of Polymers, *J. Polymer Sci.* **A1**, 3183-3196 (1963).
- (37) B.D. Coleman and T.G. Fox, A Multistate Mechanism for Homogeneous Ionic Polymerization: I. The Diastereosequence Distribution, *J. Polymer Sci.* **38**, 1065-1067 (1963).
- (38) B.D. Coleman and T.G. Fox, A Multistate Mechanism for Homogeneous Ionic Polymerization: II. The Molecular Weight Distribution, *J. Am. Chem. Soc.* **85**, 1241-1244 (1963).
- (39) B.D. Coleman and T.G. Fox, On the Two-State Mechanism for Homogeneous Ionic Polymerization, *J. Polymer Sci.* **C4**, 345-360 (1963).
- (40) B.D. Coleman, F. Gornick and G. Weiss, Statistics of Irreversible Termination in Homogeneous Anionic Polymerization, *J. Polymer Sci.* **39**, 3233-3239 (1963).

- (41) B.D. Coleman and W. Noll, Material Symmetry and Thermostatic Inequalities in Finite Elastic Deformations, *Arch. Rational Mech. Anal.* **15**, 87-111 (1964).
- (42) B.D. Coleman, Thermodynamics of Materials with Memory, *Arch. Rational Mech. Anal.* **17**, 1-46 (1964).
- (43) B.D. Coleman, On Thermodynamics, Strain Impulses, and Viscoelasticity, *Arch. Rational Mech. Anal.* **17**, 230-254 (1964).
- (44) B.D. Coleman and W. Noll, Simple Fluids with Fading Memory, *Proceedings of the Symposium on Second-Order Effects in Elasticity, Plasticity, and Fluid Dynamics*, Haifa, April 1962; 530-552 (1964).
- (45) B.D. Coleman and H. Markovitz, Incompressible Second-Order Fluids, *Advances in Applied Mechanics* **8**, 69-101 (1964).
- (46) B.D. Coleman and H. Markovitz, Normal Stress Effects in Second-Order Fluids, *J. Appl. Phys.* **35**, 1-9 (1964).
- (47) B.D. Coleman and H. Markovitz, Nonsteady Helical Flows of Second-Order Fluids, *Phys. Fluids* **7**, 833-841 (1964).
- (48) B.D. Coleman and V.J. Mizel, Existence of Caloric Equations of State in Thermodynamics, *J. Chem. Phys.* **40**, 1116-1125 (1964).
- (49) B.D. Coleman, R.J. Duffin and V.J. Mizel, Instability, Uniqueness, and Nonexistence Theorems for the Equation $u_t = u_{xx} - u_{xtx}$ on a Strip, *Arch. Rational Mech. Anal.* **19**, 100-116 (1965).
- (50) B.D. Coleman, M.E. Gurtin, and I. Herrera R., Waves in Materials with Memory. I. The Velocity of One-Dimensional Shock and Acceleration Waves, *Arch. Rational Mech. Anal.* **19**, 1-19 (1965).
- (51) B.D. Coleman and M.E. Gurtin, Waves in Materials with Memory. II. On the Growth and Decay of One-Dimensional Acceleration Waves, *Arch. Rational Mech. Anal.* **19**, 239-265 (1965).
- (52) B.D. Coleman and M.E. Gurtin, Waves in Materials with Memory. III. Thermodynamic Influences on the Growth and Decay of Acceleration Waves, *Arch. Rational Mech. Anal.* **19**, 266-298 (1965).
- (53) B.D. Coleman and M.E. Gurtin, Waves in Materials with Memory. IV. Thermodynamics and the Velocity of General Acceleration Waves, *Arch. Rational Mech. Anal.* **19**, 317-338 (1965).

- (54) B.D. Coleman, Simple Liquid Crystals, *Arch. Rational Mech. Anal.* **20**, 41-58 (1965).
- (55) B.D. Coleman and C. Truesdell, Homogeneous Motions of Incompressible Materials, *Z.A.M.M.* **45**, 547-551 (1965).
- (56) B.D. Coleman, R.J. Duffin, and V.J. Mizel, Symposia on Applied Mathematics, Proceedings, Vol. XVII: Applications of Nonlinear Partial Differential Equations in Mathematical Physics, American Mathematical Society, p. 86 (1965) [Summary only].
- (57) B.D. Coleman, T.G. Fox and M. Reinmüller, On Stereosequence Distributions from Anionic Polymerizations, *J. Polymer Sci. Part B*, **4**, 1029-1032 (1966).
- (58) B.D. Coleman, J.M. Greenberg and M.E. Gurtin, Waves in Materials with Memory. V. On the Amplitude of Acceleration Waves and Mild Discontinuities, *Arch. Rational Mech. Anal.* **22**, 333-354 (1966).
- (59) B.D. Coleman and V.J. Mizel, Norms and Semi-Groups in the Theory of Fading Memory, *Arch. Rational Mech. Anal.* **23**, 87-123 (1966).
- (60) B.D. Coleman and M.E. Gurtin, Thermodynamics and One-Dimensional Shock Waves in Materials with Memory, *Proc. Roy. Soc. A* **292**, 562-574 (1966).
- (61) B.D. Coleman and M.E. Gurtin, Thermodynamics and Wave Propagation, *Quarterly Applied Math.* **24**, 257-262 (1966).
- (62) B.D. Coleman and M.E. Gurtin, Acceleration Waves in Nonlinear Materials, *Modern Developments in the Mechanics of Continua*, Academic Press (1966) pp. 165-174.
- (63) B.D. Coleman and V.J. Mizel, Breakdown of Laminar Shearing Flows for Second-Order Fluids in Channels of Critical Width, *Z.A.M.M.* **46**, 445-448 (1966).
- (64) B.D. Coleman and J.M. Greenberg, Thermodynamics and the Stability of Fluid Motion, *Arch. Rational Mech. Anal.* **25**, 321-341 (1967).
- (65) B.D. Coleman and V.J. Mizel, Existence of Entropy as a Consequence of Asymptotic Stability, *Arch. Rational Mech. Anal.* **25**, 243-270 (1967).
- (66) B.D. Coleman and V.J. Mizel, A General Theory of Dissipation in Materials with Memory, *Arch. Rational Mech. Anal.* **27**, 255-274 (1967).

- (67) B.D. Coleman and M.E. Gurtin, Thermodynamics with Internal State Variables, *J. Chem. Phys.* **47**, 597-613 (1967).
- (68) B.D. Coleman and M.E. Gurtin, On the Growth and Decay of Discontinuities in Fluids with Internal State Variables, *Phys. Fluids* **10**, 1454-1458 (1967).
- (69) B.D. Coleman and M.E. Gurtin, Some Properties of Gases with Vibrational Relaxation when Viewed as Materials with Memory, *Meccanica* **2**, 125-140 (1967).
- (70) B.D. Coleman and M.E. Gurtin, Equipresence and Constitutive Equations for Rigid Heat Conductors, *Z.A.M.P.* **18**, 199-208 (1967).
- (71) B.D. Coleman and M.E. Gurtin, Thermodynamics and Wave Propagation in Non-Linear Materials with Memory, *Proceedings of the IUTAM Symposium on Irreversible Aspects of Continuum Mechanics*, Vienna, June 1966; 54-76 (1968).
- (72) B.D. Coleman and M.E. Gurtin, On the Stability Against Shear Waves of Steady Flows of Non-Linear Viscoelastic Fluids, *J. Fluid Mech.* **33**, 165-181 (1968).
- (73) B.D. Coleman, On the Use of Symmetry to Simplify the Constitutive Equations of Isotropic Materials with Memory, *Proc. Roy. Soc. A* **306**, 449-476 (1968).
- (74) B.D. Coleman and V.J. Mizel, On the General Theory of Fading Memory, *Arch. Rational Mech. Anal.* **29**, 18-31 (1968).
- (75) B.D. Coleman and V.J. Mizel, On Thermodynamic Conditions for the Stability of Evolving Systems, *Arch. Rational Mech. Anal.* **29**, 105-113 (1968).
- (76) B.D. Coleman and V.J. Mizel, On the Stability of Solutions of Functional-Differential Equations, *Arch. Rational Mech. Anal.* **30**, 173-196 (1968).
- (77) B.D. Coleman and E.H. Dill, On the Stability of Certain Motions of Incompressible Materials with Memory, *Arch. Rational Mech. Anal.* **30**, 197-224 (1968)
- (78) B.D. Coleman, On the Stability of Equilibrium States of General Fluids, *Arch. Rational Mech. Anal.* **36**, 1-32 (1970).
- (79) B.D. Coleman and D.R. Owen, On the Thermodynamics of Materials with Memory, *Arch. Rational Mech. Anal.* **36**, 245-269 (1970).

- (80) B.D. Coleman, Some Recent Results in the Theory of Fading Memory, *Proceedings of the International Conference on Thermodynamics*, Cardiff, April 1970 (Vol. 22, pp. 321-333, Pure and Applied Chemistry).
- (81) B.D. Coleman, E.H. Dill and R.A. Toupin, A Phenomenological Theory of Streaming Birefringence, *Arch. Rational Mech. Anal.* **39**, 358-399 (1970).
- (82) B.D. Coleman, On the Dynamical Stability of Fluid Phases, *Proceedings of the IUTAM Symposium on Instability of Continuous Systems*, Herrenalb (Karlsruhe), September 1969; 272-283 (1971).
- (83) B.D. Coleman and E.H. Dill, On Induced Birefringence in Viscoelastic Materials, NASA Contractor Report CR-1703 (1971).
- (84) B.D. Coleman and E.H. Dill, Thermodynamic Restrictions on the Constitutive Equations of Electromagnetic Theory, *Z.A.M.P.* **22**, 691-702 (1971).
- (85) B.D. Coleman and E.H. Dill, Theory of Induced Birefringence in Materials with Memory, *J. Mech. Phys. Solids* **19**, 215-243 (1971).
- (86) B.D. Coleman and E.H. Dill, On the Thermodynamics of Electromagnetic Fields in Materials with Memory, *Arch. Rational Mech. Anal.* **41**, 132-162 (1971).
- (87) B.D. Coleman, On Retardation Theorems, *Arch. Rational Mech. Anal.* **43**, 1-23 (1971).
- (88) B.D. Coleman, A Mathematical Theory of Lateral Sensory Inhibition, *Arch. Rational Mech. Anal.* **43**, 79-100 (1971).
- (89) B.D. Coleman, Thermodynamics of Discrete Mechanical Systems with Memory, *Advances in Chemical Physics* **24**, 95-154 (1973).
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B. Books:

Wave Propagation in Dissipative Materials, by B.D. Coleman, M.E. Gurtin, I. Herrera R., and C. Truesdell; (Springer-Verlag, 1965).

Viscometric Flows of Non-Newtonian Fluids, Theory and Experiment, by B. D. Coleman, H. Markovitz, and W. Noll; (Springer-Verlag, 1966).

C. Doctoral Dissertation, Yale University, 1954:

Vol. I - The Kinetics of the Quaternization of 4-Alkylpyridines and 4-Polyvinylpyridine with n-Butyl Bromide.

Vol. II - A Light-Scattering Study on Isoionic Bovine Serum Albumin.

D. Lecture and Course Notes:

(1) Osservazione sulla Termodinamica e sulla Teoria dell'Elasticità Finita. (Text of a lecture given at Bologna and Naples in the Spring of 1961; multiplied typescript.)

(2) On Global and Local Forms of the Second Law of Thermodynamics, in *Proprietà di Media e Teoremi di Confronto in Fisica Matematica*. (A course given at the Centro Internazionale Matematico Estivo, Bressanone, 1963.)

(3) (with M.E. Gurtin) Thermodynamics and Wave Propagation in *Elastic and Viscoelastic Media, in Non-Linear Continuum Theories*. (A course given at the Centro Internazionale Matematico Estivo, Bressanone, 1965.)

(4) Text of Lectures on Thermodynamics of Materials with Memory. Course No. 73, at the *International Centre for Mechanical Sciences*, Udine, June 1971. (Bound separately and published by Springer-Verlag, Vienna, 1972.)

(5) Thermodynamics and Constitutive Relations, in *Thermodynamics and Constitutive Equations*, Springer Lecture Notes in Physics, Vol. 228, pp. 1-43. These notes for a course of 10 Lectures at the 2nd 1982 Session of the Centro Internazionale Matematico Estivo, held in Noto, Italy, are preliminary draughts of two papers, one by B.D. Coleman and D.R. Owen, and the other by B.D. Coleman, M. Fabrizio, and D.R. Owen.

(6) (with D.R. Owen) Global and Local Versions on the Second Law of Thermodynamics, in *Categories in Continuum Physics*, Springer Lecture Notes in Mathematics, Vol. 1174 (1982) pp. 83-99 (preliminary draught).

(7) A Phenomenological Theory of the Mechanics of Cold Drawing, in *Orienting Polymers*, Springer Lecture Notes in Mathematics, Vol. 1063 (1983) pp.76-142 (preliminary draught).

(8) Materials with Fading Memory (Lectio Doctoralis, Rome, Tor Vergata, 1993; (multiplied typescript).

E. Invited Lectures since 1993:

1. "Analogues of Particle-Antiparticle Pair Production and Annihilation in the Kirchhoff-Clebsch Theory of Rods", Colloquia, University of Ferrara and University of Pisa, January 1993.
2. "The Governing Equations of Rods with Fading Memory": Workshop on Mathematical Problems in Viscoelasticity, Center for Nonlinear Analysis, Carnegie Mellon University; February 1993.
3. "Recollections of Fading Memory": The 1993 Meeting of the Society for Natural Philosophy, held at Carnegie Mellon University in April, was a symposium in honor of Walter Noll. This one-hour lecture was about Coleman's collaboration with Noll in the period 1957-68 and their work toward the formulation of a general theory of materials with gradually fading memory.
4. "On Material Instabilities Caused by Surface Diffusion": Colloquium, Centre de Mathématiques et Leurs Applications, Ecole Normale Supérieure de Cachan, 4 January 1994.
5. "Surface Diffusion and Instability": Lecture at U.S. Army Research Laboratory, Fort Monmouth, 22 February 1994.
6. "Influence of Surface Diffusion on Material Stability": Congresso Nazionale della Società Italiana di Matematica Applicata e Industriale, Anacapri, 1 June 1994.
7. "Diffusion in Axially Symmetric Surfaces" : Symposium on Trends in Applications of Mathematics to Mechanics, Lisbon, 27 July 1994.
8. "Materials with Fading Memory": Lectio Doctoralis, read at the time of receipt of the degree Laurea Honoris Causa in Mechanica Arte (Honorary Doctorate in Mechanical Engineering), University of Rome, Tor Vergata, 15 October 1994.
9. "On Material Instabilities Caused by Surface Diffusion": Colloquium, Department of Applied Mechanics and Engineering Science, University of California at San Diego, November 1994.
10. "Diffusion in Axially Symmetric Surfaces" (1 hour lecture) Conference on Models of Interphase Regions, Trento, December 1994.
11. "Dynamics and Stability of Cold Drawing Processes for Polymeric Materials": Workshop on Nonlinear Dynamics of Material Processing and Manufacturing, Institute for Mechanics and Materials, La Jolla, California, March 1995.
12. Course of 4 Lectures on Streaming Birefringence of Non-Newtonian Fluids and 1 Lecture on the Buckling of Laminar Phases while a Visiting Professor at the Laboratoire de Minéralogie-Cristallographie à l'Université de Paris VI, March and April 1995.

13. Lecture on Material Instabilities, while a Visiting Professor at the Centre de Mathématiques et de Leurs Applications, Ecole Normale Supérieure, Cachan, France, May 1995.
14. "Topology and Continuum Mechanics in Molecular Biology", Symposium in Honor of Richard MacCamy, Carnegie Mellon University, Pittsburgh, 17 - 19 August 1995.
15. "Three Manifestations of Material Instability," Workshop on Material Instabilities, Davis, California, 7-8 October 1995.
16. "Applications of Topology and Continuum Mechanics to the Molecular Dynamics of DNA", Colloquium, University of Rome, Tor Vergata, 24 May 1996.
17. "Theory of curvature driven surface diffusion", Colloquium, University of Ferrara, 26 May 1996.
18. "Applications of Topology and Continuum Mechanics in Molecular Biology" (1 hour lecture) Conference on Logic and Mechanics in Honor of Aldo Bressan, University of Padova, 27 May 1996.
19. "Some exact solutions in the theory of the dynamics of rods with applications to DNA research" Colloquium, University of Rome 3, 30 May 1996.
20. "Recent results in the theory of curvature driven surface diffusion" (Invited Seminar) Istituto per le Applicazioni del Calcolo, Rome, 31 May 1996.
21. "Topology and Continuum Mechanics in Molecular Biology" Conference in Honor of J. L. Ericksen, Baltimore, 12 June 1996.
22. "Applications of Topology and Continuum Mechanics in Molecular Biology" Symposium on Trends in Applications of Mathematics to Mechanics, Warsaw, 3 September 1996.
23. "Recent Applications of Topology and Continuum Mechanics in DNA Research" Colloquium, Physics Institute, Uniwersytet Kopernika, Torun, 9 September 1996.
24. "Examples of Materials for which Gradients of Strain Influence the Free Energy" Workshop on Thermodynamics, Cortona, Tuscany, 1 October 1996.
25. "Similarity Solutions in the Theory of Curvature Driven Diffusion" Colloquium, University of Rome, Tor Vergata, 9 October 1996.
26. "On Curvature Driven Surface Diffusion" (30 minute talk) Applied Mathematics Workshop for Materials Studies, Pennsylvania State University, 25 October 1996.

27. Held an informal 2 hour seminar before a group of about 30 people at NIH on "Current Research on the Elastic Rod Model for DNA", 5 February 1997.
28. "Theory of the Influence of End Conditions on the Tertiary Structure of DNA" (40 minute lecture) Workshop on DNA Topology, Rutgers (DIMACS PMMB/MBBC), April 1997.
29. "On Applications of Exact Solutions in the Theory of the Elastic Rod Model of DNA", International Meeting on Mathematics and Mechanics in Materials Science and Molecular Biology, Centro Congressi, Capri, 18-20 June 1997.
30. "DNA Topology and the Governing Equations of Kirchhoff's Theory of Rods" (1 hour lecture) Workshop on Differential Equations and Applications in honor of Moshe Marcus, Technion Israel Institute of Technology, 15 - 16 December 1997.
31. "Similarity Solutions in the Theory of Curvature-Driven Diffusion along Planar Curves" Mathematical Analysis and Applications Seminar, Faculty of Mathematical Sciences, The Weizmann Institute of Science, Rehovot, 17 December 1997 (AM).
32. "Theory of Equilibrium Distributions of Topoisomers for DNA Minicircles in Mononucleosomes" Seminar in Theoretical Biology, The Weizmann Institute of Science, Rehovot, 17 December 1997 (PM).
33. "A Shared Property of Certain Similarity Solutions in Theories of Evaporation-Condensation and Curvature-Driven Surface Diffusion" Symposium in Honor of John Cahn, Statistical Mechanics Conference, Rutgers, 16 May 1998.
34. "DNA Topology" Seminar at the Department of Theoretical and Applied Mechanics, Cornell University, 2 October 1998.
35. "Recent Results in the Theory of the Elastic Rod Model for DNA" Colloquium Talk, Department of Mathematics, Carnegie Mellon University, 8 October 1998.
36. "A Relation between Similarity Solutions in Theories of Curvature-Driven Diffusion along Curves and Curvature-Driven Evaporation" Lecture given at the Annual Meeting of the Society for Natural Philosophy, Pittsburgh, October 1998.
37. "On Supercoiled DNA Configurations" Colloquium, Carnegie Mellon University, Department of Mathematics, April 1999.
38. "A Problem in the Molecular Biology of DNA: The Attainment of Exact and Explicit Expressions for Supercoiled Configurations of Elastic Rings and Methods for Determining Their Stability" Symposium on Advances in Continuum Mechanics and Thermodynamics of Materials Behavior, in Honor of Roger Fosdick, Blacksburg, June 1999.

39. "Elastic Stability of Supercoiled Configurations of DNA Plasmids" Invited Lecture at the Symposium on Current Ideas in Mechanics and Related Fields, Ramat-Rachel, Jerusalem, August 1999.

40. "Stability Theorems and Explicit Representations of Exact Solutions of the Self-Contact Problem for Elastic Rods and Applications to DNA Supercoiling" Colloquium, Texas Institute for Computational and Applied Mathematics, University of Texas, Austin, October 1999.

41. Invited presentations at the Sessions on DNA Topology, American Mathematical Society Meeting, University of Texas at Austin, 8-10 October 1999:

One-hour Tutorial lecture: "Introduction to the Elastic Rod Model for DNA and Its Applications".

Paper at the DNA Topology Session: "On the Elastic Stability of Configurations of Knotted and Unknotted Miniplasmids".

Paper at the Session on Computational and Experimental Aspects of Mechanics: "On Similarity Solutions in Theories of Curvature Driven Motion of Planar Curves".

42. "The Explicit Solution Approach to Calculation of Tertiary Structures for DNA" Invited presentation at the Mini-Symposium on DNA Topology and Computational Biology, University of Texas at Dallas, 11 October 1999.

43. "On DNA Topology and the Elastic Stability of Supercoiled Configurations of Cyclized DNA" Colloquium, Department of Mechanical Engineering, Ben-Gurion University, Beer-Sheeva, December 1999.

44. "DNA Topology: A Subject at the Interface between Elasticity Theory and Molecular Biology" Plenary Lecture at the general assembly of the Hong Kong Society for Theoretical and Applied Mechanics, March 2000.

45. "Stability Theorems and Solutions of the Self-Contact Problem for Elastic Rods and Applications to DNA Supercoiling", Invited lecture at the Workshop on Elasticity, (part of the International Programme on Nonlinear Problems in Solids), City University of Hong Kong, April 2000.

46. "Self-contact Problems in Finite Elasticity that have Application in Molecular Biology", Colloquium, Department of Mechanical Engineering, City University of Hong Kong, April 2000.

47. "On DNA Supercoiling", Colloquium, Department of Mechanical Engineering, University of Pittsburgh, April 2000.

48. Invited lecture on the theory of self-contact in DNA molecules modeled as elastic rods, given at the international conference: "Nuovi Progressi nella Fisica Matematica dall'Eredità di Dario Graffi", Bologna, May 2000.

49. "On Solutions of the Self-Contact Problem for Elastic Rods and Applications to DNA Supercoiling", Invited presentation at the International Meeting on Symmetry and Stability in Nonlinear Mechanics, Budapest, July 2000.

50. "Self-Contact Problems in Elasticity and Applications to the Molecular Biology of DNA", Colloquium, Department of Theoretical and Applied Mechanics, University of Illinois at Urbana-Champaign, September 2000.

51. "On the Significance of Non-uniqueness of Entropy and Free Energy", One-hour lecture at the Annual Meeting of the Society for Natural Philosophy, University of California, Berkeley, September 2000.

52. "On the Stability of Supercoiled Configurations of DNA", Invited talk at the meeting of the Applied Mechanics Division of ASME, Orlando, November 2000.

53. "Clifford Truesdell and Thermodynamics", Opening Lecture at the Meeting in Memory of Clifford A. Truesdell III held in Pisa, November 2000.

54. "On the Non-uniqueness of the Entropy and Free Energy of Materials with Memory", Invited talk at the meeting of the Gruppo di 40 in honor of Mauro Fabrizio, Raito (Salerno), November 2000.

55. "DNA Micromechanics", Colloquium, Department of Mechanics and Materials Science, University of Nebraska, Lincoln, May 2001.

56. "On Transitions between Equilibrium Configurations of Elastic Rods", SIAM Meeting on Dynamical Systems, Snowbird, Utah, May 2001.

57. "DNA Topology and Supercoiling", Mathematics Colloquium; City University of Hong Kong, November 2001.

58. "DNA Elasticity", Mathematics Colloquium, Hong Kong University of Science and Technology; November 2001.

59. "Self-Contact Problems in Kirchhoff's Theory of Rods", Colloquium, Mathematics Department, University of Maryland, College Park, November 2001.

60. "Implications of the Dependence of DNA Configurations on Nucleotide Sequence", invited talk at the Symposium on Structured Fluids and Complex Nanostructures, Carnegie Mellon University, Pittsburgh, PA, May 2002.

61. "Clifford Truesdell and Continuum Thermodynamics", Opening address to the Symposium on New Directions in Mechanics, Continuum Thermodynamics, and Kinetic Theory, in Memory of Clifford A. Truesdell III; Blacksburg, VA, June 2002.

62. "Topology and micromechanics of DNA", Invited talk at the Workshop on Topology in Condensed Matter Physics, Max-Planck-Institut für Physik komplexer Systeme, Dresden, July 2002.

64. "On problems in theoretical mechanics that bear on issues in molecular biology", lecture at the *Symposium on Trends in the Application of Mathematics to Mechanics* (STAMM 2002), Naples, October 2002.

65. "Sequence-Dependent DNA Elasticity", SIAM Meeting on Dynamical Systems, Snowbird, Utah, May 2003.

66. "On Continuum and Discrete Models in DNA Elasticity", Invited talk at the Symposium on Continuum and Discrete Models in Mechanics, Shoshon, Israel July 2003.

67. "DNA Elasticity is a Subject in which Long Range Body Forces of Electrostatic Origin are of Importance", Invited talk at the Department of Mathematics, University of Bologna, November 2003.

68. "Recent advances in the theory of DNA Elasticity" Colloquium, Department of Physics, University of Milano, November 2003.

69. "Thermodynamics, fading memory, wave propagation, and all that jazz", Invited talk at the Symposium in Honor of M. E. Gurtin, Carnegie Mellon University, Pittsburgh, June 2004.

70. "DNA Elasticity: a new branch of non-linear Mechanics in which one studies electrically charged, intrinsically curved, rod-like nanoscale structures", Key note talk at the Annual Meeting of the Society of Engineering Science, Lincoln Nebraska, October 2004.

71. "On long-range electrical interactions in DNA elasticity", Invited talk at the Annual Meeting of the Society of Engineering Science, Lincoln Nebraska, October 2004.

72. "On bifurcations resulting from long-range electrical interactions in DNA", Invited talk at the American Mathematical Society Fall Eastern Sectional Meeting, Pittsburgh, November 2004.

73. "Examples of research at the interfaces between biology, mathematics, and mechanics", Invited seminar at the Instituto de Investigaciones Interdisciplinarias, University of Puerto Rico, Cayey, Puerto Rico, February 2005.

74. "Bifurcations of Equilibria in DNA Elasticity", Plenary lecture at El Seminario Interuniversitario de Investigación en Ciencias Matemáticas (SIDIM XX), Mayagüez, Puerto Rico, February 2005.

75. "On continuous and discrete models in DNA elasticity", Invited talk at the International Conference on Continuous and Discrete Modelling in Mechanics, held in Warsaw, Poland, September 2005, in Memory of Henryk Zorski.

76. "On the elastic behavior of DNA when both electrostatic intramolecular forces and intrinsic curvature are taken into account", Invited Seminar at the Department of Mathematics on the University of Bologna, Italy, October 2005.

77. "A recently developed theory of DNA elasticity that accounts for long range intramolecular electrical forces tells us that under physiological conditions such forces can have strange implications that should be accessible to experimental verification", Invited talk delivered at the Workshop in Honor of Gianfranco Capriz, at the Istituto Nazionale di Alta Matematica, Dipartimento di Matematica, University of Rome, October 2005

78. "On DNA elasticity with electrostatic forces taken into account", Invited talk at the Annual Meeting of the Society for Natural Philosophy, held at Polignano a Mare (Bari), Italy, October 2005.

79. "Implications of a recently developed theory of DNA elasticity that accounts for long range intramolecular electrical forces and the dependence of elastic properties on nucleotide sequence", opening talk at the Workshop on Bifurcation Analysis of Rodlike Structures and Applications in Biophysics, Rutgers, Busch Campus, October 2005.

80. "On the elastic behavior of DNA when both electrostatic intramolecular forces and intrinsic curvature are taken into account", Invited Seminar Department of Mechanical and Aerospace Engineering", University of California, San Diego, November 2005.

81. "DNA mechanics when electrostatic forces and intrinsic curvature are taken into account", Lectures given at the University of Californiam, Berkeley, at Sandia Laboratories, Livermore, and at Stanford University, Palo Alto, April 25 - 27, 2006, and at Los Alamos National Laboratories, June 1, 2006.