David Campbell Montgomery

Education
University of Wisconsin: B.S. (1956)
Princeton University, M.A. (1958); Ph.D. (1959) (physics)
D. Honoris Causa, Eindhoven University of Technology (Netherlands), 1996.

Appointments
Dartmouth College: 1984-1988, Professor of Physics
1988-2004, Eleanor and A. Kelvin Smith Professor of Physics
2004-present, Professor Emeritus and Research Professor
College of William and Mary: 1977-1984, Professor of Physics
University of Iowa: 1965-1977, Professor of Physics 1970-77, Assoc. Prof. 1965-1970
University of Maryland 1962-65, Research Assistant Professor
University of Wisconsin 1961-62, Instructor and Research Associate
Princeton University, Project Matterhorn, 1959-60, Research Associate

Visiting Appointments
University of Utrecht (Netherlands), Culham Laboratory (U.K.), University of Colorado, Oak Ridge National Laboratory, University of Alaska, Los Alamos National Laboratory, University of California at Berkeley, Bell Laboratories, University of Wisconsin, Hunter College (CUNY), National Center for Atmospheric Research, University of Maryland, University of Nagoya (Japan), Columbia University, J.E.T. (U.K.), Eindhoven University of Technology (Netherlands), Heinrich-Heine Univeristaet (Duesseldorf, Germany), Risoe National Laboratory (Roskilde, Denmark).

Consulted for
NASA Goddard Space Flight Center, NASA Headquarters, Oak Ridge National Laboratory, NASA Langley Research Center (ICASE), Los Alamos National Laboratory.

Previous Employment
Princeton University, Project Matterhorn (1959-60)
University of Wisconsin (1961-62
University of Maryland (1962-65)
University of Iowa (1965-1977)
College of William and Mary (1977-1984)

Memberships
American Physical Society (Fellow since 1969)
American Geophysical Union
Federation of American Scientists
American Association of University Professors

Synergistic Activities
Fellow of the American Physical Society since 1969.
Courses given in advanced summer schools at U.Colorado, Les Houches (France), NCAR.
Numerous invited lectures, colloquia, and seminars in many countries.
Over 200 scientific publications since 1959.
Supervised 22 Ph.D. theses and about 20 postdoctoral research associates, 1965-2005.

Received extramural grant support for many years, from NASA, U.S. Dept. of Energy, U.S. Naval Research Laboratory, National Science Foundation.
Served on numerous agency review panels. Refereed for many journals, also NASA, DoE, etc.

Courses Taught at Dartmouth - Graduate and Undergraduate
Fluid dynamics, plasma physics, magnetohydrodynamics, classical mechanics, electromagnetic theory, statistical mechanics, mathematical methods, introductory physics, special topics (turbulence)

Ph.D. theses supervised at Dartmouth
Hudong Chen (American Physical Society Fellow)
Michael L. Theobald
Xiaowen Shan (American Physical Society Fellow)
Wesley B. Jones
Shuojun Li
Alexei Kotelnikov
Brian T. Kress

Postdoctoral Research Associates Supervised at Dartmouth
Ziya Agim
Michael Brown (American Physical Society Fellow)
John Shebalin
Jill Dahlburg (American Physical Society Fellow)
Lee Phillips
Xiaowen Shan (American Physical Society Fellow)
Jason Bates
Hudong Chen (American Physical Society Fellow)
Sanjoy Ghosh
Michael Goodman
Hubert Shen
Wesley Jones
Antonio Ting (American Physical Society Fellow)

Selected Recent Publications (since 1991)

"Magnetohydrodynamically generated velocities in confined plasmas," J.A. Morales, W.T.Bos, K.Schneider, and D.C.Montgomery, Physics of Plasmas 22, 042515-042532 (2015).

J.A. Morales, W.T. Bos, K.Schneider, and D.C. Montgomery "The effect of toroidicity on reversed field pinch dynamics"Plasma Physics and Controlled Fusion 56, 095024-095031 (2014).

"Intrinsic Rotation of Toroidally Confined Magnetohydrodynamics" Jorge A. Morales, Wouter J.T. Bos, Kai Schneider, and David C. Montgomery Physical Review Letters 109, 175002 (2012).

W.H.Matthaeus, D.C. Montgomery, M. Wang, and S. Servidio "A review of relaxation and structure in some turbulent plasmas: magnetohydrodynamics and related models" Journal of Turbulence 13:1, N37 (2012), pp.1-36.

David C. Montgomery, The Enigma of the Aerofoil: Rival Theories in Aerodynamics, 1909-1930, by David Bloor [University of Chicago Press, Chicago, IL, 2011] 547 pp. (a book review). Am. J. Phys. 80, 649 (2012)

D.C. Montgomery and W.H. Matthaeus "Oseen vortex as a maximum entropy state of a two-dimensional fluid" Physics of Fluids 23, 075104 (6 pp), (2011)

D. J. Rodgers, W. H. Matthaeus, T. B. Mitchell, and D. C. Montgomery "Similarity Decay of Enstrophy in an Electron Fluid", Phys. Rev. PRL 105, 234501 (2010).

D.C. Montgomery "Worlds of Flow: A History of Hydrodynamics from the Bernoullis to Prandtl," by Olivier Darrigol (book review), Am. J. Phys. 77, 767-768 (2009).

D. J. Rodgers,1 S. Servidio, W. H. Matthaeus,1 D. C. Montgomery, T. B. Mitchell, and T. Aziz, "Hydrodynamic Relaxation of an Electron Plasma to a Near-Maximum Entropy State" Phys. Rev. PRL 102, 244501 (2009).

P.D. Mininni, D.C. Montgomery, and L.Turner "Hydrodynamic and magnetohydrodynamic computations inside a rotating sphere" New J. Phys. 9, 303(25 pages), 2007.

D.C. Montgomery "Can a physical scientist contribute significantly to the cause of peace?" Proc. Int. Conf. on Science, Technology and Peace: Conversion and Transformation ed. by Peter Schmid and Piet Schram, ISBN 978-90-810647-4-3 Eindhoven Unniversity of Technology TU/e, The Netherlands, 2006.

D.C. Montgomery Paul M. Bellan (2006): Fundamentals of Plasma Physics (book review) Theor. Comput. Fluid Dyn. 21, 79-80 (2006).

P.D. Mininni and D.C. Montgomery "Magnetohydrodynamic activity inside a sphere" Physics of Fluids 18, 116602 (13 pages), (2006).

David C. Montgomery "Some Remarks on Decaying Two-Dimensional Turbulence" chapter in "Mathematical and Physical Theory of Turbulence," ed. by J. Cannon and B. Shivamoggi Boca Raton: Chapman and Hall/CRC, 2006; pp. 91-100.

P.D. Mininni, A.G. Pouquet, and D.C. Montgomery"Small-scale structures in three-dimensional magneto- hydrodynamic turbulence" Physical Review Letters 97, 244503 (2006).

Pablo D. Mininni and David C. Montgomery "Low magnetic Prandtl number dynamos with helical forcing" Physical Review E 72, 056320 (9 pages) (2005).

Pablo D. Mininni, Yannick Ponty, David C. Montgomery, Jean-Francois Pinton, Helene Politano, and Annick Pouquet "Dynamo Regimes with a Nonhelical Forcing" Astrophysical Journal 626, 853-863 (2005).

Y. Ponty, P.D. Mininni, D.C.Montgomery, J.-F. Pinton, H.Politano, and A. Pouquet, "Numerical Study of Dynamo Action at Low Magnetic Prandtl Numbers" Physical Review Letters 94, 164502 (2005) (4 pages).

Pablo D. Mininni, David C. Montgomery, and Annick Pouquet "Numerical solutions of the three-dimensional magnetohydrodynamic alpha model" Physical Review E 71, 046304 (2005) (11 pages).

David Montgomery "Elegante tour-de-force" (book review) Nederlands Tijdschrift voor Natuurkunde 71, 186-187 (2005).

Pablo D. Mininni, David C. Montgomery, and Annick G. Pouquet "A numerical study of the alpha model for two-dimensional magnetohydrodynamic turbulent flows" Physics of Fluids 17, 035112 (2005) (17 pages)

Pablo Dmitruk and David C. Montgomery Numerical study of the decay of enstrophy in a two-dimensional Navier-Stokes fluid in the limit of very small viscosities." Physics of Fluids 17, 035114 (2005) (5 pages).

Leon P.J. Kamp and David C. Montgomery "Toroidal Steady States in Visco-resistive magnetohydrodynamics" Journal of Plasma Physics 70, 113-142 (2004).
David C. Montgomery "Magnetohydrodynamic Turbulence" (Book Review) Eos 85, No. 2, p.20 (2004).

David C. Montgomery "Marketing Science, Marketing Ourselves" Academe 89, No. 5 (Sept.-Oct. 2003)[online: http://www.jstor.org/stable/40253386]

Z. Yin, H.J.H.Clercx, and D.C. Montgomery "An easily implemented task-based parallel scheme for the Fourier pseudospectral solver applied to 2D Navier-Stokes turbulence" Computers and Fluids 33, 509-520 (2004).

Z. Yin, D.C. Montgomery, and H.J.H. Clercx
"Alternative statistical-mechanical descriptions of decaying two-dimensional turbulence in terms of 'patches' and 'points'" Physics of Fluids **15**, 1937-1953 (2003).

L.P. Kamp and D.C. Montgomery,
"Toroidal flows in resistive magnetohydrodynamic steady states," Physics of Plasmas **10**, 157-167 (2003).

Antonio Ponno, Luigi Galgani, and David C. Montgomery,
"A class of resistive axisymmetric magnetohydrodynammic equilibria in a periodic cylinder," Journal of Plasma Physics **67**, 251-269 (2002).

David C. Montgomery and Annick Pouquet,
"An alternative interpretation for the Holm 'alpha model'," Physics of Fluids **14**, 3365-3366 (2002).

D.C. Montgomery, W.H. Matthaeus, L.J. Milano, and P. Dmitruk
"Apparent suppression of turbulent magnetic dynamo action by a dc magnetic field" Physics of Plasmas **9**, 1221 (2002).

L.J. Milano, W.H. Matthaeus, P. Dmitruk, and D.C. Montgomery
"Local anisotropy in incompressible magnetohydrodynamic turbulence" Physics of Plasmas **8**, 2673 (2001).

Thomas S. Levi and David C. Montgomery
"Velocity field distributions due to ideal line vortices" Physical Review E **63**, 056311 1-8 (2001).

David C. Montgomery
"Comment on 'Does flow shear suppress turbulence in nonionized flows?'"
Physics of Plasmas **7**, 4785-4786 (2000).

Brian T. Kress and David C. Montgomery
"Pressure determinations for incompressible fluids and magnetofluids"
Journal of Plasma Physics **64**, 371-377 (2000).

B.T. Kress and D.C. Montgomery
"Incompressible pressure determinations,"
Proc. 27th European Physical Society Conference on Controlled Fusion and Plasma Physics, Budapest, Hungary, 2000. (Paper P1.003).

J.W. Bates and D.C. Montgomery
"The D'yakov-Kontorovich instability of shock waves in real gases,"
Phys. Rev. Lett. **84**, 1180 (2000),Feb. 7 issue.

D.C. Montgomery and J.W. Bates
"The geometry and symmetries of magnetohydrodyanmic turbulence: anomalies of spatial periodicity," Phys.
Plasmas **6**, 2727 (1999).

J.W. Bates and D.C. Montgomery
"Some numerical studies of exotic shock wave behavior"
Phys. Fluids 11, 462 (1999).

D.C. Montgomery, J.W. Bates, and L.P. Kamp
"MHD steady states as a model for confined plasmas"
Plasma Phys. & Contr. Fusion 41, Suppl. 3A, A507-A517 (1999).

A.D. Kotelnikov and D.C. Montgomery
"Shock Induced Turbulence in Composite Materials at Moderate Reynolds Numbers"
Phys. Fluids 10, 2037 (1998).

J.W. Bates and D.C. Montgomery
"Toroidal Visco-resistive Magnetohydrodynamic Steady States Contain Vortices" Phys. Plasmas 5, 2649 (1998).

L.P. Kamp, D.C. Montgomery, and J.W. Bates
"Toroidal Flows in Resistive Magnetohydrodynamic Steady States"
Phys. Fluids 10, 1757 (1998).

A.D. Kotelnikov and D.C. Montgomery
"Numerical Study of Shock Propagation in Inhomogeneous Material"
Proc. APS Topical Conference on "Shock Compression of Condensed Matter--1997"
Amherst, MA, July 27-31, 1997; ed. by Schmidt/Dandekar/Forbes, pp. 183-186
American Institute of Physics, 1998.

D. Montgomery and J.W. Bates
"Poloidal Flows in Resistive MHD Equilibria"
Proc. 7th European Fusion Theory Conference, Juelich, Germany, 8-10 Oct., 1997
ed. by A. Rogister;Forschungszentrum Juelich GmbH, Juelich, Germany 1998, pp.
119-121.

A.D. Kotelnikov and D. Montgomery
"A Kinetic Method for Computing Inhomogeneous Fluid Behavior"
Journal of Computational Physics 134, 364 (1997).

S. Li, D. Montgomery, and W.B. Jones
"Two-dimensional Turbulence with Rigid Circular Walls"
Theoretical Computational Fluid Dynamics 9, 167 (1997).

D. Montgomery, J.W. Bates, and S. Li
"Toroidal vortices in Resistive Magnetohydrodynamic Equilibria"
Physics of Fluids 9, 1188 (1997).

D. Montgomery, J.W. Bates, and H.R. Lewis
"Resistive Magnetohydrodynamic Equilibria"
Physics of Plasmas 4, 1080 (1997).

S. Li, D. Montgomery, and W.B. Jones
"Inverse Cascades of Angular Momentum"
Journal of Plasma Physics 56, 615 (1996).

D. Montgomery
"Entropies for Continua: Fluids and Magnetofluids", in MAXIMUM ENTROPY AND BAYESIAN METHODS, ed. by J. Skilling and S. Sibisi (Dordrecht: Kluwer, 1996), pp. 303-314.

S. Li, D. Montgomery
"Decaying Two-dimensional Turbulence with Rigid Walls"
Phys. Lett. A 218, 281, 1996

D. Montgomery & X. Shan
"Magnetohydrodynamic Turbulence with Net Currents" in 'Small-Scale Structures in Three-Dimensional Hydrodynamic and Magnetohydrodynamic Turbulence,'
edited by M. Meneguzzi, A. Pouquet, and P.-L. Sulem (Berlin, Springer-Verlag, 1995; pp. 241- 254)

D. Montgomery & W.H. Matthaeus
"Anisotropic Modal Energy Transfer in Interstellar Turbulence"
Astrophys. J. 447, 706 (1995)

X. Shan & D. Montgomery
"Magnetohydrodynamic Stabilization Through Rotation"
Phys. Rev. Lett. 73, 1624 (1994)

D. Montgomery & X. Shan "Toroidal
Resistive MHD Equilibria"
Comments on Plasma Phys. & Contr. Fusion 15, 315 (1994)

W.B. Jones & D. Montgomery
"Finite Amplitude Steady States of high Reynolds Number 2-D Channel Flow"
Physica D 73, 227 (1994)

X. Shan & D. Montgomery
On the role of the Hartmann Number in Magnetohydrodynamic Activity"
Plasma Phys. & Contr. Fusion 35, 619 and 1019 (1993).

H. Chen & D. Montgomery
"Equilibrium Properties of a Rotating Plasma: Differences Between Fluid Velocity and Drift Velocity"
J. Plasma Phys. 49, 341 (1993)

D. Montgomery, X. Shan, & W.H. Matthaeus
"Navier-Stokes Relaxation to Sinh-Poisson States at Finite Reynolds Numbers"
Phys. Fluids A 5, 2207 (1993).

D. Montgomery, W.H. Matthaeus, W.T. Stribling, D. Martinez, and S. Oughton
"Relaxation in Two Dimensions and the 'Sinh-Poisson' Equation
Phys. Fluids A 4, 3 (1992)

D. Montgomery
"Modifications of Magnetohydrodynamics as Applied to the Solar Wind"
J. Geophys. Res. 97, 4309 (1992)

D. Montgomery
"Magnetohydrodyanmic Stability Thresholds as a Function of the Hartmann Number and Pinch Ratio"
Plasma Phys. & Contr. Fusion 34, 1157 (1992)

W.H. Matthaeus, W.T. Stribling, D. Martinez, S. Oughton, & D. Montgomery
"Decaying Two-Dimensional Navier-Stokes Turbulence at Very Long Times"
Physica D 51, 531 (1991)

X. Shan, D. Montgomery, & H. Chen
"Nonlinear Magnetohydrodynamics by Galerkin-method Computation"
Phys. Rev. A 44, 6800 (1991).