

## Steven H. Strogatz

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Ithaca, NY 14853-4201

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personal website: [www.stevenstrogatz.com](http://www.stevenstrogatz.com)

### Employment

2016–present Stephen H. Weiss Presidential Fellow, Cornell  
2009–present Professor of Mathematics, Cornell  
2009–2014 Professor of Mechanical and Aerospace Engineering, Cornell  
2007–present Jacob Gould Schurman Professor of Applied Mathematics, Cornell  
2005–2012 Director, Center for Applied Mathematics, Cornell  
2000–2009 Professor, Theoretical and Applied Mechanics, Cornell  
1994–2000 Associate Professor, Theoretical and Applied Mechanics, Cornell  
1993–1994 Associate Professor of Applied Mathematics, Dept. of Mathematics, MIT  
1989–1993 Assistant Professor of Applied Mathematics, Dept. of Mathematics, MIT  
1986–1989 NSF Postdoc in Mathematical Sciences, Harvard and Boston University

### Education

Ph. D., (1986), Applied Mathematics, Harvard University.  
B. A., first class honours (1982) and M.A. (1986), Mathematics, Cambridge University.  
A. B., summa cum laude (1980), Mathematics, Princeton University.

### Research Interests

Nonlinear dynamics and complex systems applied to physics, biology, and social science.

### Honors and Awards

Stephen H. Weiss Presidential Fellow (2016).  
(Cornell’s highest teaching award.)  
Fellow of the American Mathematical Society (2016).  
 (“For contributions to nonlinear dynamics and complex systems, and for the promotion of mathematics in the public sphere.”)  
Joseph Priestley Award (2015).  
 (“Presented by Dickinson College in memory of Joseph Priestley, discoverer of oxygen, to a distinguished scientist whose work has contributed to the welfare of humanity. The award, first presented in 1952, recognizes outstanding achievement and contribution to our understanding of science and the world.” Past recipients include Francis Crick, Margaret Mead, and Linus Pauling.)  
Lewis Thomas Prize for Writing About Science (2015).  
 (“Honors the rare individual who bridges the worlds of science and the humanities—

whose voice and vision can tell us about science's aesthetic and philosophical dimensions, providing not merely new information but cause for reflection, even revelation." Past recipients include Lewis Thomas, Oliver Sacks, and Freeman Dyson. Awarded by Rockefeller University.)

Fellow of the American Physical Society (2014).  
("For seminal work on complex networks, nonlinear oscillators, and synchronization phenomena.")

Euler Book Prize (2014).  
("The Euler Book Prize is awarded annually to an author or authors of an outstanding book about mathematics. The Prize is intended to recognize authors of exceptionally well written books with a positive impact on the public's view of mathematics and to encourage the writing of such books." Awarded by the Mathematical Association of America.)

Public Engagement with Science Award (2013).  
("For his exceptional commitment to and passion for conveying the beauty and importance of mathematics to the general public." Past recipients include Carl Sagan, Neil deGrasse Tyson, John Allen Paulos, and E.O. Wilson. Awarded by the American Association for the Advancement of Science.)

Fellow of the American Academy of Arts and Sciences (2012).

Fellow of the Society for Industrial and Applied Mathematics (2009).  
("For investigations of small-world networks and coupled oscillators and for outstanding science communication.")

Highly Cited Paper in Physics (2008).  
(for "Collective dynamics of small-world networks," which ranked #6 on the list of most highly cited papers in physics for 1998-2008).

Jacob Gould Schurman Professor (2007).  
(A university-wide endowed chair at Cornell.)

Communications Award from the Joint Policy Board for Mathematics (2007).  
(A lifetime award, presented jointly by the four major American mathematical societies, "to reward journalists and other communicators who, on a sustained basis, bring accurate mathematical information to non-mathematical audiences. The award recognizes a significant accumulated contribution to the public understanding of mathematics.")

Tau Beta Pi Teaching Award (2006).  
("Professor of the Year" in the College of Engineering, Cornell).

Robert '55 and Vanne '57 Cowie Teaching Award, College of Engineering, Cornell (2001).

President's Award for Outstanding Contributions in Support of Underrepresented Minorities, Cornell (2000).

J.P. and Mary Barger '50 Teaching Award, College of Engineering, Cornell (1997).

NSF Presidential Young Investigator (1990–1995).

E. M. Baker Award for Excellence in Undergraduate Teaching (1991).  
(MIT's highest teaching prize)

NSF Postdoctoral Fellowship in Mathematical Sciences (1986–1989).

Senior Scholarship and Tripos Prize, Trinity College, Cambridge, England (1982).

Marshall Scholar, Trinity College, Cambridge (1980–1982).

### **Prize Lectures and Named Lectures**

Evnin Lecture, Princeton University (2012).

Louis Clark Vanuxem Lecture, Princeton University (2011).

(“...a series of public lectures before the University annually on subjects of scientific interest. ... Lecturers have included Edwin P. Hubble on “The Exploration of Space” (1931-1932); James B. Conant on “The Mobilization of American Scientists for the War”; and Carl Sagan on “Extraterrestrial Life” (1972-1973).)

Simons Lecture Series, MIT (2011).

(“The Department of Mathematics annually presents the Simons Lecture Series to celebrate the most exciting mathematical work by the very best mathematicians of our time.”)

AMS-MAA-SIAM Gerald and Judith Porter Public Lecture, Joint Mathematics Meetings, Washington, DC (2010).

Rouse Ball Lecture, University of Cambridge (2009).

(Previous lecturers include Einstein, Dirac, Pauli, Mandelbrot, Lorenz, and numerous Nobel laureates and Fields Medalists.)

I. E. Block Community Lecturer, SIAM Annual Meeting, San Diego (2001).

### **Grants**

“Transdisciplinary Research in Principles of Data Science (TRIPODS) Program: Data Science for Improved Decision-Making: Learning in the Context of Uncertainty, Causality, Privacy, and Network Structures,” Co-PI, National Science Foundation, 10/1/2017-9/30/2020, \$1,496,655.

“Research Training Grant: Dynamics, Probability, and Partial Differential Equations in Pure and Applied Mathematics,” Principal Investigator, National Science Foundation, 9/1/2017-8/31/2022, \$2,494,525.

“Nonlinear dynamics of oscillator networks,” Principal Investigator, National Science Foundation, 7/1/2015-6/30/2018, \$400,575.

Cyber-Enabled Discovery and Innovation Program, “CDI Type II: Complex dynamics in the Internet: A computational analytic approach,” Co-Principal Investigator, National Science Foundation CCF-0835706, 2008-2012, \$1,500,000.

“Nonlinear dynamics of oscillator networks,” Principal Investigator, National Science Foundation, 2004-2007, \$524,061.

Integrative Graduate Education and Research Training (IGERT) grant, “Program in Nonlinear Systems,” Co-Principal Investigator, National Science Foundation DGE-0333366, 2003-2008, \$3,436,000.

“Nonlinear dynamics of oscillator networks,” Principal Investigator, National Science Foundation, 2000-2003, \$312,042.

Integrative Graduate Education and Research Training (IGERT) grant, “Program in Nonlinear Systems,” Principal Investigator, National Science Foundation, 1998-2003, \$2,245,997.

“Mutual synchronization of biological oscillators,” Principal Investigator, National Science Foundation, 1996-1999, \$180,000.

“Synchronization and communication in nonlinear optical systems,” Co-Principal Investigator, National Science Foundation, 1996-1999, \$268,123.

“Nonlinear dynamics of oscillator arrays,” Principal Investigator, National Science Foundation, 1995-1998, \$180,000.

“Large systems of coupled nonlinear oscillators in physics and biology,” Principal Investigator, National Science Foundation, 1992-1995, \$75,000.

National Science Foundation Presidential Young Investigator Award, 1990–1995, \$205,000 (\$125,000 base grant + \$40,000 grant from AT&T + \$40,000 matching money from NSF).

“Large systems of coupled nonlinear oscillators,” Principal Investigator, National Science Foundation, 1989–1991, \$37,000.

### **Teaching Awards and Summary**

Department of Mathematics Teaching Award, Cornell (2012).

Swanson Teaching Award, College of Engineering, Cornell (2009).

Tau Beta Pi Teaching Award (“Professor of the Year” in the College of Engineering) (2006).

Robert '55 and Vanne '57 Cowie Excellence in Teaching Award, College of Engineering, Cornell (2001).

J.P. and Mary Barger '50 Teaching Award, College of Engineering, Cornell (1997).

Awarded MIT's top teaching prize, the E. M. Baker Award for Outstanding Teaching (1991).

Awarded four Certificates for Distinction in Teaching, Harvard University, Committee on Undergraduate Education (1983, 1984, 1985, 1987).

### **Courses taught at Cornell**

Calculus for the Life and Social Sciences (Math 1106)

Mathematical Explorations (Math 1300)

Multivariable Calculus (Math 1920)

Differential Equations for Engineers (Math 2930)

Advanced Engineering Analysis (TAM 3100)

Introduction to Analysis (Math 3110)

History of Mathematics (Math 4030)

Differential Equations and Dynamical Systems (Math 4200)

Nonlinear Dynamics and Chaos (Math 4210/MAE5790)

Applied Complex Analysis (Math 4220)

Intermediate Dynamics (TAM 5700)

Methods of Applied Mathematics (TAM 6100, 6110)

Asymptotics and Perturbation Methods (TAM 6130)

Complex Systems (TAM 6780)

Applied Dynamical Systems (Math 7170/TAM 7760)

### **Courses taught at MIT**

18.02 Calculus  
18.04 Complex Variables  
18.085 Mathematical Methods for Engineers  
18.311 Principles of Applied Mathematics  
18.385 Nonlinear Dynamics and Chaos

### **Science Communication and Outreach**

#### ***New York Times series:***

**Me, Myself and Math** (a six-part online series in 2012)

Singular Sensations (Sep. 10, 2012)  
Friends You Can Count On (Sep. 17, 2012)  
Proportion Control (Sep 24, 2012)  
It's My Birthday Too, Yeah (Oct. 1, 2012)  
Dangerous Intersection (Oct. 8, 2012)  
Visualizing Vastness (Oct. 15, 2012)

**Steven Strogatz on The Elements of Math** (a 15-part online series in 2010)

The Hilbert Hotel (May 9, 2010)  
Group Think (May 2, 2010)  
Chances Are (April 25, 2010)  
It Slices, It Dices (April 18, 2010)  
Change We Can Believe In (April 11, 2010)  
Take It to the Limit (April 4, 2010)  
Power Tools (March 28, 2010)  
Think Globally (March 21, 2010)  
Square Dancing (March 14, 2010)  
Finding Your Roots (March 7, 2010)  
The Joy of X (Feb. 28, 2010)  
Division and Its Discontents (Feb. 21, 2010)  
The Enemy of My Enemy (Feb. 14, 2010)  
Rock Groups (Feb. 7, 2010)  
From Fish to Infinity (Jan. 31, 2010)

#### ***New York Times Op-Eds:***

Like water for money. New York Times, Wild Side guest column (June 2, 2009).  
Loves me, loves me not (Do the math). New York Times, Wild Side guest column (May 26, 2009).  
Math and the city. New York Times, Wild Side guest column (May 19, 2009).  
A journey to baseball's alternate universe. (with Sam Arbesman) New York Times, Op-Ed page (March 30, 2008).  
How the blackout came to life. New York Times, Op-Ed page (August 25, 2003).  
The real scientific hero of 1953. New York Times, Op-Ed page (March 4, 2003).

### ***Huffington Post:***

S. Strogatz. The 3 Most Confusing Things Your Math Teacher Ever Told You, Huffington Post, Dec. 13, 2012.

S. Strogatz. Could you park safely on the world's steepest street? Huffington Post, August 22, 2014.

S. Strogatz and C. Ratti. Taking rides with strangers. Huffington Post, Sep. 2, 2014.

### ***The New Yorker:***

S. Strogatz. Why Pi Matters. The New Yorker, March 13, 2015.

S. Strogatz. Einstein's First Proof. The New Yorker, November 19, 2015.

## **Radio and Web Appearances**

### ***Radiolab:***

"For the Love of Numbers" (5/2/14)

"What a Slinky Knows" (9/10/12)

"Loops" (10/4/11)

"The Good Show" (12/14/10)

"Limits" (4/16/10)

"Numbers" (10/9/09)

"Are We Coins?" podcast (6/29/09)

"Yellow Fluff and Other Curious Encounters" (12/12/08)

"(So-Called) Life" (3/14/08)

"Emergence" (2/18/05)

### ***LA Theatre Works:***

"Proof" - explores themes of women in math, the nature of genius, creativity, proof, intuition, and elegance

"Arcadia" - about the history and significance of chaos theory and fractal geometry as they relate to the play

"Six Degrees of Separation" - about human connections, the small-world effect, and networks

### ***Science Friday:***

"Does Math Matter?" (7/3/2015)

"Hello, Stranger, Wanna Share a Cab?" (9/5/14)

"Celebrating irrational, transcendental pi" (3/14/14)

"Steven Strogatz: The Joy of x" (10/5/12)

"Steven Strogatz Talks Math" (2/26/10)

"Scientists Debate 'Six Degrees of Separation'" (1/25/08)

### ***Other radio and Web appearances:***

Talk Nerdy podcast (4/25/17)

"Steven Strogatz Brings Math To The Traumatized And Perplexed" - WBUR Edify (4/10/17)

“Teach Better Podcast Episode 45: Inspiring Students With Steven Strogatz” (1/2/17)  
“Deep Dive: Is Math Important?” - The Aspen Institute, Aspen Ideas Festival (6/30/15)  
“Morality, Math and Movies” - Cain & Cupp, Radio interview (10/11/14)  
“Should We Start Sharing Taxis?” - WNYC, The Brian Lehrer Show (9/3/14)  
VIP (Very Important Puzzler) on NPR/WNYC quiz show Ask Me Another (8/2/13)  
"The heart of the beat" - CBC Radio Ideas (4/22/13)  
"The Joy of x" - GigaOm (10/16/12)  
"The Joy of x" - Literary New England (10/8/12)  
"Pi: A window on infinity" -- Colin McEnroe Show (3/14/11)  
Ideas Network -- Wisconsin Public Radio (6/24/10)  
"Swarm in here ... or is it just me?" -- SETI (6/21/10)  
"Math for the nonmathletic" -- Colin McEnroe Show (3/15/10)  
"Who are You Connected To?" -- Morning Edition (6/4/98)

## Television

[How Kevin Bacon Cured Cancer](#) (also known as Connected: The Power of Six Degrees)

Documentary about networks, aired on ABC Australia, Oct. 28, 2008; Discovery Canada, Jan. 8, 2009; Discovery Science Channel US, Feb. 15, 2009; BBC Two, United Kingdom, May 5, 2009. 2009 winner of the Australian Museum Eureka Prize, the most prestigious award in Australian science. 2010 winner of Best Film, SCINEMA Festival of Science Film Competition.

[Sync: The Emerging Science of Spontaneous Order](#) - C-SPAN BookTV, 92nd St Y, Mar. 25, 2003, conversation with Alan Alda

## Video

[TED Talk](#) on how things in nature tend to sync up (Monterey, CA, Feb. 2004)

[Parabolas \(etc.\) from WNYC/NPR Radio Lab](#) (a video inspired by Radio Lab episode “Yellow fluff and other curious encounters.”)

Simons Lecture Series, Mathematics Department, MIT (2011).

("The Department of Mathematics annually presents the Simons Lecture Series to celebrate the most exciting mathematical work by the very best mathematicians of our time.")

[1. Coupled oscillators that synchronize themselves](#)

[2. Social networks that balance themselves](#)

[3. Blogging about math for the New York Times](#)

[Louis Clark Vanuxem Lecture](#), Princeton University (2011).

[Induction speech at American Academy of Arts and Sciences](#) (10/6/12)

[The Infinite Mind: Exploring Mathematical Genius](#), 92<sup>nd</sup> St Y and World Science Festival (March 11, 2016).

[The Brachistochrone, with Steven Strogatz](#) (April 11, 2016)

[A Well-Lighted Place](#) (interview about writing)

[Math for the Masses](#) (lecture about writing "The Elements of Math" blog for the NY Times)

[The Calculus of Friendship](#) (conversation with Alan Alda)

[The Calculus of Friendship](#) (trailer on YouTube)

[The Calculus of Friendship](#) (one-hour lecture)

[Fractal lecture from Chaos](#): The Teaching Company

SEED Magazine: Salon with architect and designer Carlo Ratti, SEED Magazine, December 2008. [Video](#) Transcript

[A Simple Rhythm](#) -- Documentary about synchronization in nature (aired at Calgary International Film Festival and Vancouver International Film Festival, 2010)

### **Selected Press**

National Public Radio, 13.7 Cosmos & Culture (11/18/17) The big idea behind big data

Physicsworld.com (11/14/2017) Putting a damper on wobbly bridges

New York Times (4/19/17) How Six Degrees Became a Forever Meme

Nature (3/6/17) Taxi-sharing in cities follows universal maths law

Nautilus (2/17/17) How to Understand Extreme Numbers

Technology Review (1/13/17) Mathematical Model Reveals the Patterns of How Innovations Arise

Business Insider (6/8/16) An Ivy League professor explains chaos theory, the prisoner's dilemma, and why math isn't really boring

The Atlantic (7/1/15) The Dilemma of Math

Science (5/29/15) Rock-paper-scissors may explain evolutionary 'games' in nature

New York Times (4/2/15) The Problem With Math Problems: We're Solving Them Wrong

Wall Street Journal (10/19/14) Billionaires and Mathematicians Crack Jokes at the Geekiest

Event of the Season -- Wall Street's Wealthy 'Quants' Gather At Geeky Fundraiser for Math

The Atlantic (10/6/14) Teaching math to people who think they hate it

New York Times (9/1/14) If 2 New Yorkers Shared a Cab...

U.S. News (9/1/14) Going My Way? Taxi-Sharing Offers Big Benefits, Study Finds

Washington Post (8/1/14) The Mathematics of Discovering New Things

Wired (August 2014) The Mathematics of Novelties and Innovations

Physics Today (October 2012) Exotic chimera dynamics glimpsed in experiments

Boston Globe (9/27/12) Steven Strogatz teaches math to the masses

Science News (9/22/12) When networks network



New York Times (11/9/10) Voices: What's next in science  
 Harvard Business Review (4/29/10) The best New York Times business columnist you've never heard of  
 Nature Physics (2010) News and Views: Spontaneous synchrony breaking  
 O, The Oprah Magazine (9/18/09) Social not-working: The perils of too much communication  
 New York Times (11/8/05) All together now: Synchrony explains swaying  
 Discovery News (8/21/03) Language's status drives its survival  
 New York Times (12/26/00) First cells, then species, now the web  
 New York Times (6/16/98) Mathematicians prove that it's a small world  
 Nature (6/4/98) News and Views: It's a small world  
 New York Times (1/6/98) Flirting male crabs found to wave claws in unison  
 New York Times (8/13/91) A mystery of nature: Mangroves full of fireflies blinking in unison  
 New York Times (1/8/85) Strange scroll-like wave is linked to biological processes

### **Other Outreach**

Aspen Ideas Festival, Aspen, CO, June 28-30 (2015)  
 National Math Festival, Smithsonian Institution, Washington DC (April 18, 2015).  
 Adviser and interviewee on MATHematics Illuminated (2007-08)  
     A 13-part video and web-based educational series, produced by Oregon Public Broadcasting and funded by the Annenberg Foundation. The series won a WebVisionary Award in 2008, in the “educational/resource” category.  
 Science adviser, Radio Lab, WNYC (2006-present)  
 Science consultant, “QED” – a Broadway play about Richard Feynman (2001-2002).  
 Interviewed and quoted by the New York Times, Washington Post, Baltimore Sun, National Journal, and San Jose Mercury Sun, about how “six degrees of separation” makes us all feel personally affected by the World Trade Center attack (September 2001).

### **Professional Activities**

AMS-MAA-SIAM Committee on the Porter Public Lecture (2017-2020)  
 Judge, Math-O-Vision (2013-2014)  
 Judge, Rosenthal Prize for Innovation in Mathematics Teaching, Museum of Mathematics (2012-2014)  
 Euler Book Prize Committee, MAA (2015)  
 Advisory Council, Museum of Mathematics (2010-present)  
 Science adviser, RadioLab, WNYC (2006-present)  
 Advisory Board, SIAM Dynamical Systems Activity Group (2006-2007)  
 External Faculty, Santa Fe Institute (2004-2010)  
 Editorial Boards:  
     Archimede (Italy), International Committee (2016-present)  
     Notices of the American Mathematical Society (2013-2015)  
     Quanta Magazine, Simons Foundation (2013–present)  
     Math Horizons (2013–present).  
     Co-Editor, Princeton Studies in Complexity (2004-present)  
     Journal of Nonlinear Science (2003-2006)  
     International Journal of Bifurcation and Chaos (1999-present)  
     SIAM Review (1997-2002)

SIAM Journal on Applied Mathematics (1995–1998)  
 Co-Organizer (with M. Silber), SIAM Conference on Applications of Dynamical Systems (1997)  
 Director, SIAM Activities Group on Dynamical Systems (1996-1999)  
 Co-Chairman (with L. Keshet), Gordon Research Conference on Theoretical Biology (1992)

### **Ph.D. Students and Their Current Affiliations**

*MIT:*

1. Shinya Watanabe (Applied Mathematics, 1995)
2. Mauricio Barahona (Physics, 1996)

Ibaraki University  
 Imperial College

*Cornell:*

3. Duncan Watts (Theoretical and Applied Mechanics, 1997)
4. M.K. Stephen Yeung (Theoretical and Applied Mechanics, 1999)
5. Duncan Callaway (Theoretical and Applied Mechanics, 2001)
6. Joel Ariaratnam (Applied Mathematics, 2002)
7. Michelle Girvan (Physics, 2003)
8. Daniel Wiley (Applied Mathematics, 2006)
9. Danny Abrams (Theoretical and Applied Mechanics, 2006)
10. Sam Arbesman (Computational Biology, 2008)
11. Erik Martens (Theoretical and Applied Mechanics, 2009)
12. Lauren Childs (Applied Mathematics, 2010)
13. Seth Marvel (Applied Mathematics, 2011)
14. Tim Novikoff (Applied Mathematics, 2013)
15. Isabel Kloumann (Applied Mathematics, 2016)
16. Danielle Toupou (Applied Mathematics, 2016)
17. Kevin O’Keeffe (Applied Mathematics, 2017)
18. Bertrand Ottino-Löffler (Applied Mathematics, 2018)
19. Irena Papst (Applied Mathematics, expected 2019)
20. Lindsay Mercer (Applied Mathematics, expected 2020)

Microsoft Research  
 U. San Francisco  
 UC Berkeley  
 St. Martin’s Press  
 U. Maryland  
 US Government  
 Northwestern U.  
 Lux Capital  
 Tech Univ. Denmark  
 Virginia Tech  
 U. Michigan  
 Google  
 Facebook  
 Intel  
 MIT  
 MIT

### **Master's Students**

John Weisenfeld (TAM, 1997)

### **Postdoctoral Fellows**

Ricardo Oliva (2001)  
 Basant Sharma (2004)  
 Marc Timme (2005)

### **Diversity**

Co-PI of Cornell’s Summer Mathematics Institute, (2006-2013), a summer “boot camp” for mathematically talented women and minority undergraduates who are headed for graduate school and desire a stronger foundation in analysis and algebra.

## **Publications**

A. Worcel, S. Strogatz, and D. Riley. Structure of chromatin and the linking number of DNA. *Proceedings of the National Academy of Sciences USA* 78, 1461-1465 (1981).

S. Strogatz. Estimating the torsional rigidity of DNA from supercoiling data. *Journal of Chemical Physics* 77, 580-581 (1982).

S. Strogatz. Topology of zig-zag chromatin. *Journal of Theoretical Biology* 103, 601-607 (1983).

A.T. Winfree and S.H. Strogatz. Singular filaments organize chemical waves in three dimensions. I. Geometrically simple waves. *Physica D* 8, 35-49 (1983).

A.T. Winfree and S.H. Strogatz. Singular filaments organize chemical waves in three dimensions. II. Twisted waves. *Physica D* 9, 65-80 (1983).

A.T. Winfree and S.H. Strogatz. Singular filaments organize chemical waves in three dimensions. III. Knotted waves. *Physica D* 9, 333-345 (1983).

A.T. Winfree and S.H. Strogatz. Singular filaments organize chemical waves in three dimensions. IV. Wave taxonomy. *Physica D* 13, 221-233 (1984).

S.H. Strogatz, M.L. Prueitt, and A.T. Winfree. Exotic shapes in chemistry and biology. *IEEE Computer Graphics and Applications* 4 (1), 66-69 (1984).

A.T. Winfree and S.H. Strogatz. Organising centres for three-dimensional chemical waves. *Nature* 311, 611-615 (1984).

S. Strogatz. Yeast oscillations, Belousov-Zhabotinsky waves, and the non-retraction theorem. *Mathematical Intelligencer* 7 (2), 9-17 (1985).

S.H. Strogatz and R.E. Kronauer. Circadian wake-maintenance zones and insomnia in man. *Sleep Research* 14, 219 (1985).

S.H. Strogatz, R.E. Kronauer, and C.A. Czeisler. Circadian regulation dominates homeostatic control of sleep length and prior wake length in humans. *Sleep* 9, 353-364 (1986).

C.A. Czeisler, J.S. Allan, S.H. Strogatz, J.M. Ronda, R. Sanchez, C.D. Rios, W.O. Freitag, G.S. Richardson, and R.E. Kronauer. Bright light resets the human circadian pacemaker independent of the timing of the sleep-wake cycle. *Science* 233, 667-671 (1986).

S.H. Strogatz. A comparative analysis of models of the human sleep-wake cycle. In: *Lectures on Mathematics in the Life Sciences*, Vol. 19: ed. G. Carpenter, American Mathematical Society, Providence, pp. 1-37 (1987).

S.H. Strogatz, R.E. Kronauer, and C.A. Czeisler. Circadian pacemaker interferes with sleep onset at specific times each day: role in insomnia. *American Journal of Physiology* 253, R172-R178 (1987).

S.H. Strogatz. Human sleep and circadian rhythms: a simple model based on two coupled oscillators. *Journal of Mathematical Biology* 25, 327-347 (1987).

S.H. Strogatz. Author's summary in Open Peer Commentary on "The Mathematical Structure of the Human Sleep-Wake Cycle." *Journal of Biological Rhythms* 2, 317-321 (1987).

S.H. Strogatz. Love affairs and differential equations. *Mathematics Magazine* 61, 35 (1988).

S.H. Strogatz and R.E. Mirollo. Phase-locking and critical phenomena in lattices of coupled nonlinear oscillators with random intrinsic frequencies. *Physica D* 31, 143-168 (1988).

S.H. Strogatz and R.E. Mirollo. Collective synchronisation in lattices of non-linear oscillators with randomness. *Journal of Physics A: Mathematical and General* 21, L699-L705 (1988).

S.H. Strogatz, C.M. Marcus, R.M. Westervelt, and R.E. Mirollo. Simple model of collective transport with phase slippage. *Physical Review Letters* 61, 2380-2383 (1988).

S.H. Strogatz, C.M. Marcus, R.M. Westervelt, and R.E. Mirollo. Collective dynamics of coupled oscillators with random pinning. *Physica D* 36, 23-50 (1989).

C.M. Marcus, S.H. Strogatz, and R.M. Westervelt. Delayed switching in a phase-slip model of charge-density wave transport. *Physical Review B* 40, 5588-5592 (1989).

S.H. Strogatz and R.M. Westervelt. Predicted power laws for delayed switching of charge-density waves. *Physical Review B* 40, 10501-10508 (1989).

R.E. Mirollo and S.H. Strogatz. Jump bifurcations and hysteresis in an infinite-dimensional dynamical system of coupled spins. *SIAM Journal on Applied Mathematics* 50, 108-124 (1990).

S.H. Strogatz. Interpreting the human phase response curve to multiple bright-light exposures. *Journal of Biological Rhythms* 5, 169-174 (1990).

R.E. Mirollo and S.H. Strogatz. Amplitude death in an array of limit-cycle oscillators. *Journal of Statistical Physics* 60, 245-262 (1990).

P.C. Matthews and S.H. Strogatz. Phase diagram for the collective behavior of limit-cycle oscillators. *Physical Review Letters* 65, 1701-1704 (1990).

R.E. Mirollo and S.H. Strogatz. Synchronization of pulse-coupled biological oscillators. *SIAM Journal on Applied Mathematics* 50, 1645-1662 (1990).

R.E. Mirollo and S.H. Strogatz. Integral representation of a finite spike. *American Mathematical Monthly* 97, 901-903 (1990).

P.C. Matthews and S.H. Strogatz. Chaotic mappings and probability distributions. *College Mathematics Journal* 22, 45-47 (1991).

K.Y. Tsang, S.H. Strogatz, and K. Wiesenfeld. Reversibility and noise sensitivity of Josephson arrays. *Physical Review Letters* 66, 1094-1097 (1991).

K.Y. Tsang, R.E. Mirollo, S.H. Strogatz, and K. Wiesenfeld. Dynamics of a globally coupled oscillator array. *Physica D* 48, 102-112 (1991).

S.H. Strogatz and R.E. Mirollo. Stability of incoherence in a population of coupled oscillators. *Journal of Statistical Physics* 63, 613-635 (1991).

P.C. Matthews, R.E. Mirollo, and S.H. Strogatz. Dynamics of a large system of coupled nonlinear oscillators. *Physica D* 52, 293-331 (1991).

H.A. Stone, A. Nadim, and S.H. Strogatz. Chaotic streamlines inside drops immersed in steady Stokes flows. *Journal of Fluid Mechanics* 232, 629-646 (1991).

J.J. Tyson and S.H. Strogatz. The differential geometry of scroll waves. *International Journal of Bifurcations and Chaos* 1, 723-744 (1991).

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