

CURRICULUM VITAE – JONATHAN BEN FREUND

Principal Employment:

Current: University of Illinois at Urbana-Champaign

Donald Biggar Willett Professor, 2016– (MechSE 67%; Aerospace 33%)

Professor, Aug. 2010– (MechSE 67%; Aerospace 33%)

Associate Professor, Aug. 2004–Aug. 2010

Assistant Professor, July 2001–Aug. 2004

Prior: UCLA Assistant Professor, Jan. 1998–July 2001

Additional Positions:

Computational Science and Engineering Faculty, UIUC, 2001–present

Senior Visiting Fellow, CTR, Stanford University, 2001

Part time faculty, Beckman Institute, UIUC, 2005–2011

Research Director, Center for Simulation of Advanced Rockets, UIUC, 2008–2010

Professor, College of Engineering, Coordinated Science Lab, 2014–present

co-Director XPACC — the Center for Exascale Simulation of Plasma-coupled Combustion
(\$20M DOE funding under PSAAPII), 2014–present

Awards:

Excellence in Faculty Mentoring Award, 2017

Donald Biggar Willett Professorship, 2016

Fellow of the American Physical Society, 2011

Associate Fellow AIAA, 2011

Kritzer Faculty Scholar (endowed scholarship), 2011-2016

Xerox Award for Faculty Research, 2010

François Frenkiel Award, APS Division of Fluid Dynamics, 2008

UIUC List of Teachers Ranked Excellent by Their Students, 2004, 2008–2011, 2013–2015

Engineering Council Award for Excellence in Advising, 2008, 2013

Winner APS DFD Gallery of Fluid Motion, 2000

Education:

Ph.D.	Mechanical Engineering	Stanford University	January 1998
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M.S.	Mechanical Engineering	Stanford University	June 1992
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B.S.	Mechanical Engineering	Stanford University	June 1991
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Courses Taught:

Cellular Biomechanics (redesigned course)

Molecular Dynamics Simulation (new course)

Simulation Prediction with Quantified Uncertainty (new course)

Spectral Methods

Advanced Graduate Fluid Mechanics

Advanced CFD

Introductory Fluid Mechanics

Introductory Numerical Methods

Boundary Layer Theory

Primary Research Interests:

Fluid mechanics, mechanics of nanometer-scale systems, numerical methods, combustion, plasma-flow coupling, biomedical fluid mechanics, aerodynamic sound

Outside Professional Activities:

Editor:

Physics of Fluids, Associate Editor (2010–2016)

Annual Review of Fluid Mechanics, Editorial Board (2011, 2014–2018)

Physical Review Fluids, Associate Editor (2016–)

Paper Referee: *Journal of Fluid Mechanics*, *Physical Review Fluids/Letters/B/E*, *Journal of Computational Physics (Certificate of Excellence 2013)*, *Physics of Fluids*, *SIAM Journal on Applied Mathematics*, *Journal of Sound and Vibration*, *AIAA Journal*, *PLOS One*, *PLOS Computational Biology*, *Journal of Chemical Physics*, *Journal of Physical Chemistry*, *Nanotechnology*, *Microcirculation*, *Journal of Heat Transfer*, *International Journal of Heat Transfer*, *European Journal of Mechanics B – Fluids*, *Journal of Turbulence*, *Theoretical and Computational Fluid Dynamics*, *Journals of Fluids and Structures*, *Biophysical Journal*, *Microcirculation*, *Soft Matter*.

Funding: DOE, NASA, AFOSR, ONR, NIH, NSF, Rolls Royce

Meeting lead organizer:

Directions in Computational Flow Physics, San Diego, CA, Sept. 2012

APS/DFD: Chair for Annual Meeting, Chicago 2020

Proposal Referee/Panelist: NSF (2004, 2006, 2007, 4×2010, 2×2012, 2014, 2×2016), DOE (2006), ARO (2015), AFOSR (2015), European Research Council (2015), European Commission Authentication Service (ECAS), IPODI Post-Doc Initiative TU Berlin (2015)

Member: APS (DFD), AIAA, SoR, Biophysical Society

Consultant: Sirensensor, HERA, BR, IllinoisRocstar, Halliburton

Committee/Panel Service:

AIAA Aeroacoustics Technical Committee (2000–2006)

APS/DFD Acrivos Dissertation Award in Fluid Mechanics Selection Committee (2001–2002)

NASA Glenn 4th Computational Aeroacoustics Workshop Technical Committee

Organized Aeroacoustics Sessions (~ 60 papers), AIAA Aerospace Sciences Meeting (2003)

APS/DFD Technical Program Committee Chair 2005 Annual Meeting

L/MRAC NSF national computing allocations committee (2006–2010)

Track Chair, MD Simulation of Microscale and Nanoscale Phenomena, 5th International Conference on Nanochannels, Microchannels & Minichannels (ICNMM2007)

INCITE DOE supercomputer allocations committee (2007, 2013–2016)

DOE ALCC super computer allocations committee (2015–2016)

APS/DFD External Affairs Committee (2008, vice-chair 2009, chair 2010–2013)

Advisory Committee/Panelist: ERCOFTAC Symposium on Sound Source Mechanisms in Turbulent Shear-Flow (2008)

Society of Engineering Science (SES), Board of Directors, (2009-2011)
 SES Honors Committee (2010-2011)
 APS/DFD Executive Committee elected Member-at-Large (2012-2015)
 Advisory Committee: 9th Int. Symp. on Turbulence and Shear Flow Phenomena (2015)
 Illinois—Blue Waters computer time allocation committee (2014-present)
 Reviewer: Department of Energy ASCR Leadership Computing Challenge (2015)
 APS/DFD Frenkiel award selection committee (2015-present)
 International Scientific Committee, CFD in Medicine and Biology II, Albufeira, Portugal
 (2015)
 APS/DFD Officer: elected Secretary/Treasurer (2015-2018)
 APS/DFD: *ad hoc* committee on Frenkiel Award changes (2016)
 Local organizing committee: Tenth International Symposium on Turbulence and Shear
 Flow Phenomena (TSFP10)

Invited Talks:

Graduate Aeronautical Laboratories, Caltech, Jan. 1998
 United Technologies Research Center, Hartford, CT, Aug. 1998
 United Technologies Research Center, Hartford, CT, Nov. 1998
 University of California, San Diego, Jan. 1999
 University of California, Santa Barbara, Feb. 1999
 University of Southern California, March 1999
 Eidgenössische Technische Hochschule, Zürich, June 1999
 ASME, Division of Fluid Dynamics, Summer Meeting, July 1999
 University of California, Irvine, May 2000
 NASA Glenn Research Center, Cleveland, OH, May 2000
 United Technologies Research Center, Hartford, CT, Dec. 2000
 University of Illinois at Urbana–Champaign, IL, Mar. 2001
 Northwestern University, Evanston, IL, May 2001
 ASME, Winter Annual Meeting, Nov. 2001
 NASA Glenn Research Center, Cleveland, OH, Dec. 2002
 Purdue University, Apr. 2002
 Universidad Politécnica de Madrid, May 2002 (short course on MD)
 Universidad Politécnica de Madrid, May 2002 (seminar on jet noise)
 Caltech, Pasadena, CA, Oct. 2002
 National Center for Microgravity Research, Cleveland, OH, Dec. 2002
 Seoul National University, Mar. 2003 (seminar on nanofluidics)
 Seoul National University, Mar. 2003 (seminar on jet noise)
 Illinois Institute of Technology, Apr. 2003
 AIAA Fluid Dynamics Conference, June 2003
 U.S. Nat. Cong. on Comp. Mech., Nanofluidics keynote talk, Aug. 2003
 Princeton University, Nov. 2003
 Aerodynamisches Institut, Aachen, Germany, Mar. 2004
 ICTAM 2004, Warsaw, Poland, Sept. 2004
 Reynolds Symposium, APS-DFD Meeting, Seattle, Nov. 2004
 Northwestern University, Evanston, IL, Jan. 2005
 Notre Dame University, South Bend, IN, Jan. 2005

Stanford University, Stanford, CA, March 2005
Sandia National Lab, Albuquerque, NM, April 2005
AIAA Fluid Dynamics Conference, Toronto, June 2005
United Technologies Research Center, Hartford, CT, June 2005
Japan/U.S. Joint Seminar on Nano. Transport, Matsushima, Japan, July 2005
SIAM Annual Meeting, New Orleans, LA, July 2005
University of Florida, Gainesville, FL, Nov. 2005
University of California, Santa Barbara, CA, Feb. 2006
University of Texas, Austin, TX, Feb. 2006 (jet noise)
University of Texas, Austin, TX, Feb. 2006 (evaporating menisci)
California Institute of Technology, Pasadena, CA, March 2006 (jet noise)
California Institute of Technology, Pasadena, CA, March 2006 (leukocyte margination)
Purdue University, West Lafayette, IN, April 2006 (jet noise)
Purdue University, West Lafayette, IN, April 2006 (evaporating menisci)
University of California, Santa Barbara, CA, Oct. 2006
Brown University, Providence, RI, Nov. 2006
Duke University, Durham, NC, Nov. 2006 (jet noise)
Duke University, Durham, NC, Nov. 2006 (evaporating menisci)
Centre d'Etudes Aerodynamiques et Thermiques, Poitiers, France, July 2007
New Mexico State University, Las Cruces, NM, April 2007
Stanford University, Symposium Honoring John Kim, Stanford, CA, Sept. 2007
Kungliga Tekniska Högskolan (KTH), Stockholm, Nov. 2007
Centre d'Etudes Aerodynamiques et Thermiques, Jet Noise Symposium, July 2008
University of Iowa, Iowa City, IA, Oct. 2008
Notre Dame, South Bend, IN, Nov. 2008
François Frenkiel Award Lecture, APS-DFD, San Antonio, TX, Nov. 2008
AIAA Aerospace Sciences Mtg., session on immersed mesh methods, Orlando, Jan. 2009
Acoustical Society of America, 157th Meeting, Portland, OR, May 2009
International Kidney Stone Institute Meeting, Indianapolis, IN, Dec. 2009
Johns Hopkins, Baltimore, MD, Feb. 2010
University of Southampton, UK, IUTAM symposium, Mar. 2010
NASA/NAVAIR/ONR/NRL/AFRL Jet LES Workshop, NASA Glenn, May 2010
Centre d'Etudes Aerodynamiques et Thermiques, June 2010
University of Michigan, Ann Arbor, MI, Jan. 2011
University of Maryland, College Park, MD, March 2011
Notre Dame University, South Bend, IN, Jan. 2012
Northwestern University, Evanston, IL, April 2012
Int. Conf. on Numerical Methods in Multiphase Flows, State College, PA, June 2012
Transition and Turbulence—EPTT2012, São Paulo, Brazil, Sept. 2012 [2 lectures]
GE Global Research, Niskayuna, NY, June 2012
ICES, UT Austin, Austin, TX, Dec. 2012
Directions in Computational Flow Physics (Conference), San Diego, CA, Oct. 2012
Society of Engineering Science, Biomembranes Keynote, Providence, RI, July 2013
Stanford University, Stanford, CA, Oct. 2013
University of Washington, Seattle, CA, Nov. 2013
AFOSR, MURI Review on Plasma-Assisted Comb., invited guest speaker, Oct. 2013
Iowa State University, Ames, IA, Mar. 2014
Mathematical Bioscience Institute, OSU, Columbus, OH, Mar. 2014

SIAM Annual Meeting, Chicago, IL, July 2014
 Miss. State Conf. on Diff. Eq. and Comp. Sim., Starkville, MS, principal lecture, Oct. 2014
 Sandia National Laboratory, Albuquerque, NM, Jan 2015
 Los Alamos National Laboratory, Los Alamos, NM, Jan 2015
 University of Wisconsin, Madison, WI, Feb 2015
 University of Illinois at Urbana–Champaign, Physics Colloquium, Feb 2015
 University of Iowa, Iowa City, IA, March 2015
 Lawrence Livermore National Laboratory, Livermore, CA, March 2015
 Princeton University, Princeton, NJ, March 2016
 University of Maryland, College Park, MD, April 2016
 University of Pennsylvania, Philadelphia, PA, April 2016
 AFOSR, Combustion Program, invited guest speaker, June 2016
 Seoul National University, Seoul, Korea, July 2016
 ICTAM2016, Montreal, Aug. 2016
 Sandia National Laboratory, Albuquerque, NM, Nov. 2016
 Lawrence Livermore National Laboratory, Livermore, CA, Nov. 2016
 Los Alamos National Laboratory, Los Alamos, NM, Dec. 2016
 Workshop on UQ and Data-Driven Modeling, Austin, TX, Mar. 2017

Publications:

in refereed journals:

- J. B. FREUND & M. G. MUNGAL, “Drag and wake modification of axisymmetric bluff bodies using coanda blowing,” *AIAA J. of Aircraft*, **31**, 572–578 (1994).
- J. B. FREUND, S. K. LELE & P. MOIN, “Calculation of the radiated sound field using an open Kirchhoff surface,” *AIAA J.*, **34**(5), 909–916 (1996).
- J. B. FREUND, “A proposed inflow/outflow boundary condition for direct computation of aerodynamic sound,” *AIAA J.*, **35**, 740–742 (1997).
- J. B. FREUND, “A simple method for computing far-field sound in aeroacoustic computations,” *J. Comp. Phys.*, **157**, 796–800 (2000).
- T. COLONIUS & J. B. FREUND, “Application of Lighthill’s equation to a Mach 1.92 turbulent jet,” *AIAA J.*, **38**(2), 368–370 (2000).
- J. B. FREUND, S. K. LELE & P. MOIN, “Compressibility effects in a turbulent annular mixing layer. Part 1. Turbulence and growth rate,” *J. Fluid Mech.*, **421**, 229–267 (2000).
- J. B. FREUND, P. MOIN & S. K. LELE, “Compressibility effects in a turbulent annular mixing layer. Part 2. Mixing of a passive scalar,” *J. Fluid Mech.*, **421**, 269–292 (2000).
- J. B. FREUND & P. MOIN, “Jet mixing enhancement by high amplitude fluidic actuation,” *AIAA J.*, **38**(10), 1863–1870 (2000).
- J. B. FREUND, S. K. LELE & P. MOIN, “Direct numerical simulation of a Mach 1.92 turbulent jet and its sound field,” *AIAA J.*, **38**(11), 2023–2031, (2000).
- J. B. FREUND, “Noise sources in a low-Reynolds-number turbulent jet at Mach 0.9,” *J. Fluid Mech.* **438**, 277–305 (2001).
- P. KOUMOUTSAKOS, J. B. FREUND & D. PAREKH, “Evolution strategies for automatic optimization of jet mixing,” *AIAA J.* **39**(5), 967–969 (2001).
- J. B. FREUND, “Electro-osmosis in a nanometer-scale channel studied by atomistic simulation,” *J. Chem. Phys.* **116**(5) 2194–2200 (2002).

- J. B. FREUND & T. FLEISCHMAN, “Ray traces through unsteady jet turbulence,” *Int. J. Aeroacoustics* **1**(1) 83–96 (2002).
- K. MOHSENI, T. COLONIUS & J. B. FREUND, “An evaluation of linear instability waves as sources of sound in a supersonic turbulent jet,” *Phys. Fluids* **14**(10), 3593–3560 (2002).
- J. B. FREUND, “The atomic detail of a wetting/de-wetting flow,” *Phys. Fluids* **15**(5), L33–L36 (2003).
- J. B. FREUND, “Noise-source turbulence statistics and the noise from a Mach 0.9 jet,” *Phys. Fluids* **15**(6), 1788–1799 (2003).
- J. F. MORELAND, J. B. FREUND & G. CHEN, “The disparate thermal conductivity of carbon nanotubes and diamond nanowires studied by atomistic simulation,” *Microscale Thermophysical Engineering* **8**(1), 61–69 (2004).
- M. MOORE, N. KALYANASUNDARAM, J. B. FREUND & H. T. JOHNSON, “Structural and sputtering effects of medium energy ion bombardment of silicon,” *Nuclear Instruments and Methods in Physics Research B*, **225**, 241–255 (2004).
- J. B. FREUND, “The atomic detail of an evaporating meniscus,” *Phys. Fluids* **17** 022104 (2005).
- H. ZHAO & J. B. FREUND, “Lattice-dynamical calculation of phonon scattering at ideal Si-Ge interfaces,” *J. App. Phys.* **97**, 024903 (2005).
- N. KALYANASUNDARAM, J. B. FREUND & H. T. JOHNSON, “Atomistic determination of continuum mechanical properties of ion-bombarded silicon,” *ASME Journal of Engineering Materials and Technology* **127**(4), 457–461 (2005).
- B. KAR, R. M. DELGADO III, O. H. FRAZIER, I. D. GREGORIC, M. T. HARTING, Y. WADIA, T. J. MYERS, R. D. MOSER & J. B. FREUND, “The effect of LVAD aortic outflow-graft placement on hemodynamics and flow,” *Texas Heart Institute Journal*, **32**(3) 287–293 (2005).
- M. WEI & J. B. FREUND, “A noise-controlled free shear flow,” *J. Fluid Mech.*, **546**, 123–152 (2006).
- M. WANG, J. B. FREUND & S. K. LELE, “Computational prediction of flow generated sound,” *Ann. Rev. Fluid Mech.*, **38**, 483–512 (2006).
- N. KALYANASUNDARAM, M. MOORE, J. B. FREUND & H. T. JOHNSON, “Stress evolution due to medium energy ion bombardment of silicon,” *Acta Materialia* **54**(2) 483–491 (2006).
- J. KASTNER, M. SAMIMY, J. HILEMAN & J. B. FREUND, “Comparison of noise sources in high and low Reynolds number high speed jets,” *AIAA J.* **44**(10) 2251–2258 (2006).
- A. SAMANTA, J. B. FREUND, M. WEI & S. K. LELE, “The robustness of acoustic analogies for predicting mixing-layer noise,” *AIAA J.* **44**(11) 2780–2786 (2006).
- J. B. FREUND, “Leukocyte margination in a model microvessel,” *Phys. Fluids*, **19**(3) 023301 (2007).
- J. B. FREUND, T. COLONIUS & A. P. EVAN, “A cumulative shear mechanism for tissue damage initiation in shock-wave lithotripsy,” *Ultrasound in Med. Biol.* **33**(9) 1495–1503 (2007).
- N. KALYANASUNDARAM, M. WOOD, J. B. FREUND & H. T. JOHNSON, “Stress evolution to steady state in ion bombardment of silicon,” *Mechanics Research Communications* **35** 50–56 (2008).
- H. ZHAO, J. B. FREUND & R. D. MOSER, “A fixed-mesh method for incompressible flow-structure systems with finite solid deformations,” *J. Comp. Phys.* **227**(6) 3114–3140

- (2008).
- M. Z. HOSSAIN, J. B. FREUND & H. T. JOHNSON, “Differential sputter yields in $\text{Si}_{1-x}\text{Ge}_x$,” *J. App. Phys.* **103** 073508 (2008).
- N. KALYANASUNDARAM, M. GHAZISAEIDI, J. B. FREUND & H. T. JOHNSON, “Single impact crater functions for ion bombardment of silicon,” *App. Phys. Letters*, **92** 131909 (2008).
- J. B. FREUND, “Suppression of shocked-bubble expansion due to tissue confinement with application to shock-wave lithotripsy,” *J. Acoustical Soc. America*, **123**(5) 2867–2874 (2008).
- A. SAMANTA & J. B. FREUND, “Finite-wavelength scattering of incident acoustic and vorticity waves at a shrouded-jet exit,” *J. Fluid Mech.*, **612** 407–438 (2008).
- M. GHAZISAEIDI, J. B. FREUND & H. T. JOHNSON, “Statistical characterization of surface defects created by Ar ion bombardment of crystalline silicon,” *J. App. Phys.* **104** 054304 (2008).
- H. ZHAO & J. B. FREUND, “Full-spectrum phonon relaxation times in crystalline Si,” *J. App. Phys.* **104** 033514 (2008).
- R. R. KLEINMAN & J. B. FREUND, “The sound from mixing layers simulated with different ranges of turbulence scales,” *Phys. Fluids* **20**(10) 101503 (2008).
- H. ZHAO & J. B. FREUND, “Phonon scattering at a rough interface between two fcc lattices,” *J. App. Phys.* **105** 013515 (2009).
- N. KALYANASUNDARAM, J. B. FREUND & H. T. JOHNSON, “A multiscale crater function model for ion-induced pattern formation in silicon,” *Journal of Physics: Condensed Matter* **21** 224018 (2009).
- Y. DAIMON, T. L. JACKSON, V. TOPALIAN, J. B. FREUND & J. BUCKMASTER, “Effect of propellant morphology on acoustics in a planar rocket motor,” *Theor. and Comp. Fluid Dyn.* **23** 63–77 (2009).
- M. Z. HOSSAIN, J. B. FREUND & H. T. JOHNSON, “Improved calculation of Si sputter yield via first principles derived interatomic potential,” *Nuclear Instruments and Methods in Physics Research B*, **267**, 1061–1066 (2009).
- J. B. FREUND & T. COLONIUS, “Turbulence and sound-field pod analysis of a turbulent jet,” *Int. J. Aeroacoustics* **8**(4) 337–354 (2009).
- A. M. WILLIS & J. B. FREUND, “Enhanced droplet spreading due to thermal fluctuations,” *J. Physics: Condensed Matter* **21**, 464128 (2009).
- J. B. FREUND, R. K. SHUKLA & A. P. EVAN, “Shock-induced bubble jetting into a viscous fluid with application to tissue injury in shock-wave lithotripsy,” *J. Acoustical Soc. America* **126**(5) 2746–2756 (2009).
- H. ZHAO, A. H. G. ISFAHANI, L. OLSON & J. B. FREUND, “A spectral boundary integral method for flowing blood cells,” *J. Comp. Phys.* **229** 3726–2744 (2010).
- A. M. WILLIS & J. B. FREUND, “Thermal capillary waves relaxing on atomically thin liquid films,” *Phys. Fluids* **22**, 022002 (2010).
- V. D. TOPALIAN & J. B. FREUND, “Boundary formulations for high-order finite differences on staggered meshes” *Computers and Fluids* **39** 1332–1344 (2010).
- V. D. TOPALIAN & J. B. FREUND, “Acoustic resonance in a ducted-jet system” *AIAA Journal* **48**(7) 1348–1360 (2010).
- R. SHUKLA, C. PANTANO & J. B. FREUND, “An interface capturing method for the simulation of multi-phase compressible flows,” *J. Comp. Phys.* **229** 7411–7439 (2010).

- S. M. HÖGBERG, H. O. ÅKERSTEDT, T. S. LUNDSTRÖM & J. B. FREUND, “Respiratory deposition of fibers in the non-inertial regime-development and application of a semi-analytical model,” *Aerosol Science and Technology* **44**(10) 847–860 (2010).
- R. R. KLEINMAN, D. J. BODONY & J. B. FREUND, “Shear-flow excitation mechanisms of recessed localized arc-filament plasma actuators,” *Phys. Fluids* **22**(11) 116103 (2010).
- A. V. G. CAVALIERI, P. JORDAN, Y. GERVAIS, M. WEI & J. B. FREUND, “Intermittent sound generation and its control in a free-shear flow,” *Phys. Fluids* **22**(11) 115113 (2010).
- A. A. PAHLAVAN & J. B. FREUND, “Effect of solid properties on slip at a fluid-solid interface,” *Phys. Rev. E* **83**(2) 021602 (2011).
- D. WU, J. B. FREUND, S. E. FRASER & J. VERMOT, “Mechanistic basis of otolith formation during teleost inner ear development,” *Developmental Cell* **22** 271–279 (2011) [including cover art].
- J. B. FREUND & M. M. ORESCANIN, “Cellular flow in a small blood vessel,” *J. Fluid Mech.* **671** 466-490 (2011).
- J. B. FREUND, “Adjoint-based optimization for understanding and suppressing jet noise,” *J. Sound Vib.* **330** 4114–4122 (2011).
- M. Z. HOSSAIN, K. DAS, J. B. FREUND & H. T. JOHNSON, “Ion impact crater asymmetry determines surface ripple orientation,” *App. Phys. Lett.* **99** 151913 (2011).
- J. ZHANG, T. L. JACKSON, J. D. BUCKMASTER & J. B. FREUND, “Numerical modeling of shock-to-detonation transition in energetic materials,” *Comb. and Flame* **159** 1769–1778 (2012).
- J. B. FREUND, J. GOETZ, K. HILL & J. VERMOT, “Fluid flows and forces in development: functions, features and biophysical principles,” *Development* **139** 1229–1245 (2012).
- J. KIM, D. J. BODONY & J. B. FREUND, “Effect of large-eddy simulation fidelity on predicted mechanisms of jet noise reduction,” *J. Prop. and Power* **28**(2) 259–268 (2012).
- M. SCHLEGEL, B. R. NOACK, P. JORDAN, A. DILLMANN, E. GRÖSCHEL, W. SCHRÖDER, M. WEI, J. B. FREUND, O. LEHMANN & G. TADMOR, “On least-order flow representations for aerodynamics and aeroacoustics,” *J. Fluid Mech.* **697** 367–398 (2012) [including cover art].
- M. Z. HOSSAIN, J. B. FREUND & H. T. JOHNSON, “Ion impact energy distribution and sputtering of Si and Ge,” *J. App. Phys.* **111** 103513 (2012).
- J. B. FREUND & B. SHAPIRO, “Transport of particles by magnetic forces and cellular blood flow in a model microvessel,” *Phys. Fluids* **24** 051904 (2012).
- A. H. G. ISFAHANI & J. B. FREUND, “Forces on a wall-bound leukocyte in a small vessel due to red cells in the blood stream,” *Biophysical Journal* **103** 1604–1615 (2012).
- J. B. FREUND, “The flow of red blood cells through a narrow spleen-like slit,” *Phys. Fluids* **25** 110807 (2013).
- A. TIWARI, J. B. FREUND & C. PANTANO, “A diffuse interface model with immiscibility preservation,” *J. Comp. Phys.* **252** 290–309 (2013).
- H. ANTON, S. HARLEPP, C. RAMSPACHER, D. WU, F. MONDUC, S. BHAT, M. LIEBLING, C. PAOLETTI, G. CHARVIN, J. B. FREUND & J. VERMOT “Pulse propagation by a capacitive mechanism drives embryonic blood flow,” *Development* **140** 4426–4434 (2013).
- W. WANG, T. G. DIACOVO, J. CHEN, J. B. FREUND & M. R. KING “Simulation of platelet, thrombus and erythrocyte hydrodynamic interactions in a 3D arteriole with *in vivo* comparison,” *PLOS One* **8**(10) e76949 1–11 (2013).

- J. B. FREUND, “Numerical simulation of flowing blood cells,” *Ann. Rev. Fluid Mech.* **46** 67–95 (2014).
- K. DAS, J. B. FREUND & H. T. JOHNSON, “A FIB induced boiling mechanism for rapid nanopore formation,” *Nanotechnology* **25** 035303 (2014).
- J. KIM, D. J. BODONY & J. B. FREUND, “Adjoint-based control of loud events in a turbulent jet,” *J. Fluid Mech.* **741** 28–59 (2014).
- J. B. FREUND & J. VERMOT, “The wall-stress footprint of blood cells flowing in microvessels,” *Biophysical Journal* **106**(3) 752–762 (2014).
- J. D. KREHBIEL, L. C. SCHIDEMAN, D. A. KING & J. B. FREUND, “Algal cell disruption using microbubbles to localize ultrasonic energy,” *Bioresource Technology* **173** 448–451 (2014).
- J. B. FREUND, “A critical assessment of resolution for red-blood-cell simulation,” *Procedia IUTAM* **16** 99–105 (2015).
- R. VISHNAMPET, D. B. BODONY & J. B. FREUND, “A practical discrete-adjoint method for high-fidelity compressible turbulence simulations,” *J. Comp. Physics* **285** 173–192 (2015).
- K. DAS, J. B. FREUND & H. T. JOHNSON, “Mechanisms of material removal and mass transport in focused ion beam nanopore formation,” *J. App. Physics* **117** 085304 (2015).
- R. A. FONTAINE, G. S. ELLIOTT, J. M. AUSTIN & J. B. FREUND, “Very near-nozzle shear-layer turbulence and jet noise,” *J. Fluid Mech.* **770** 27–51 (2015).
- J. B. FREUND & R. H. EWOLDT, “Quantitative rheological model selection: Good fits versus credible models using Bayesian inference,” *J. of Rheology* **59**(3) 667–701 (2015).
- F. BOSELLI, J. B. FREUND & J. VERMOT, “Blood flow mechanics in cardiovascular development,” *Cellular and Molecular Life Sciences* **72** 2545–2559 (2015).
- K. DAS, H. T. JOHNSON & J. B. FREUND, “Atomic-scale thermocapillary flow in focused ion beam milling,” *Phys. Fluids* **27** 052003 (2015).
- A. TIWARI, C. PANTANO & J. B. FREUND, “Growth-and-collapse dynamics of small bubble clusters near a wall,” *J. Fluid Mech.* **775** 1–23 (2015).
- A. SAMANTA & J. B. FREUND, “A model supersonic buried-nozzle jet: instability and acoustic wave scattering and the far-field sound,” *J. Fluid Mech.* **778** 189–215 (2015).
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