

Curriculum Vitae
Yves Dubief, PhD

Department of Mechanical Engineering, University of Vermont, e-mail: ydubief@uvm.edu

Education

Institution	Major	Degree	Year
Institut National Polytechnique de Grenoble, France	Mechanical Engineering	Eng. Dipl.	1995
Institut National Polytechnique de Grenoble, France	M.S.	1996	
Institut National Polytechnique de Grenoble, France	Ph.D.	2000	

Appointments

2016- Present	Chair of Department of Mechanical Engineering, University of Vermont
2014- 2016	Program Director of Mechanical Engineerin, University of Vermont
2012- Present	Associate professor of Mechanical Engineerin, University of Vermont
2005-2011	Assistant professor of Mechanical Engineerin, University of Vermont
2002-2005	Research associate, Center for Turbulence Research, Stanford, CA
2001-2002	Postdoctoral fellow, Center for Turbulence Research, Stanford, CA
2000-2001	Postdoctoral fellow, Mech. Eng. Dept., University of Newcastle, NSW, Australia
1996-1997	Research engineer, French Army, Grenoble, France

Research Directions

The overarching theme of my research is the understanding of turbulence and chaos in complex fluid flows using high fidelity simulations. The main efforts include:

- **Polymer flows.** Using direct numerical simulations, my research on drag reduction by polymer additives from 2001 to 2005 unraveled the key interactions between polymer dynamics and vortices leading to drag reduction in turbulent flows and preventing relaminarization. Since my discovery of elasto-inertial turbulence in 2010, a chaotic state driven by polymer dynamics in subcritical and supercritical flows, I have led the way in the simulation and understanding of this state. In 2020, my collaborators and I established the existence of an exact coherent state. My efforts have been recognized with an invitation to write a review for Annual Review of Fluid Mechanics for the 2022 volume. This effort has generated on-going collaborations with University of Cambridge (UK), Institute of Science and Technology (Austria), the Weissmann Institute of Science (Israel) and University of Liège (Belgium).
- **Scalar transport.** Related to the first effort, I have been interested in the dynamics and the modeling of scalar transport in non-equilibrium flows. A synergistic experimental/numerical research project with University of New Hampshire has so far yielded a demonstration of the inadequacy of turbulence models for scalar transport, an identification of the source of error for such models, and further understanding in the dynamics of oscillatory flows. This work is a vector of collaboration with the MOST team (LEGI, Grenoble, France).
- **Simulation of plasma flows.** Over the past few years, my group has developed a numerical platform to simulate gas/surface interactions between thermal protection systems and the plasma flow caused by the atmospheric entry of a vehicle. The platform is based on YALES2 a high fidelity simulation flow solver from CORIA (Rouen, France) and is used in collaboration with an inductively coupled plasma torch experiment at UVM to characterize the thermodynamics and chemistry occurring at the surface of materials developed by NASA.

- **Future directions.** COVID-19 has created a new interest: The use of high fidelity simulation for science-based decision in the design of experiments, equipment and regulations for environmental risks. Leveraging the capabilities and agility of YALES2, a collaboration between LEGI, CORIA, Universities of Montpellier and Paris, and Safran is demonstrating the power and value of high-fidelity simulation to better understand the dynamics of aerosols from breathing, coughing and sneezing. The simulations carried out are realistic situations relevant to the protection of health care workers and the population. I intend to pursue this collaboration and extend the scope to other environmental factors, in particular pollution and cooling in a warming world.

Over the years, I have demonstrated the ability to sustain my research group with creative ideas, federal fundings from nearly all major agencies in the US and a track record of successful collaborations.

Peer-Reviewed Publications

Google scholar metrics: <https://scholar.google.com/citations?user=nE7d30kAAAAJ&hl=en>

25. Dubief, Y., & Terrapon, V. (2020). Heat transfer enhancement and reduction in low-rayleigh number natural convection flow with polymer additives. *Physics of Fluids*, *32*, 3033103. doi: 10.1063/1.5143275
24. Hurwitz, Z., Dubief, Y., & Almassalkhi, M. (2020). Economic efficiency and carbon emissions in multi-energy systems with flexible buildings. *International Journal of Electrical Power and Energy Systems*. (Accepted)
23. Ebadi, A., White, C. M., Pond, I., & Dubief, Y. (2019). Mean dynamics and transition to turbulence in oscillatory channel flow. *Journal of Fluid Mechanics*, *880*, 864–889. doi: 10.1017/jfm.2019.706
22. White, C., Dubief, Y., & Klewicki, J. (2018). Properties of the mean momentum balance in polymer drag-reduced channel flow. *Journal of Fluid Mechanics*, *834*, 409–433.
21. Sid, S., Terrapon, V., & Dubief, Y. (2018). Two-dimensional dynamics of elasto-inertial turbulence and its role in polymer drag reduction. *Physical Review Fluids*, *3*(1), 011301.
20. Pond, I., Ebadi, A., Dubief, Y., & White, C. M. (2017). An integral validation technique of rans turbulence models. *Computers & Fluids*, *149*, 150–159.
19. Reagan, A. J., Dubief, Y., Dodds, P. S., & Danforth, C. M. (2016). Predicting flow reversals in a computational fluid dynamics simulated thermosyphon using data assimilation. *PloS one*, *11*(2), e0148134.
18. Terrapon, V. E., Dubief, Y., & Soria, J. (2015). On the role of pressure in elasto-inertial turbulence. *Journal of Turbulence*, *16*(1), 26–43.
17. Dubief, Y., Terrapon, V. E., & Soria, J. (2013). On the mechanism of elasto-inertial turbulence. *Physics of Fluids*, *25*(11), 110817.
16. Samanta, D., Dubief, Y., Holzner, M., Schäfer, C., Morozov, A. N., Wagner, C., & Hof, B. (2013). Elasto-inertial turbulence. *Proceedings of the National Academy of Sciences*, *110*(26), 10557–10562.

15. White, C., Dubief, Y., & Klewicki, J. (2012). Re-examining the logarithmic dependence of the mean velocity distribution in polymer drag reduced wall-bounded flow. *Physics of Fluids*, 24(2), 021701.
14. Haynes, L. M., Dubief, Y. C., & Mann, K. G. (2012). Membrane binding events in the initiation and propagation phases of tissue factor-initiated zymogen activation under flow. *Journal of Biological Chemistry*, 287(8), 5225–5234.
13. Haynes, L. M., Dubief, Y., Orfeo, T., & Mann, K. G. (2010). The effects of flow on the activation of bovine prothrombin by prothrombinase at physiologically relevant shear rates. *The FASEB Journal*, 24(1 Supplement), 835–4.
12. Haynes, L. M., Dubief, Y. C., Orfeo, T., & Mann, K. G. (2011). Dilutional control of prothrombin activation at physiologically relevant shear rates. *Biophysical journal*, 100(3), 765–773.
11. Rollin, B., Dubief, Y., & Doering, C. (2011). Variations on kolmogorov flow: turbulent energy dissipation and mean flow profiles. *Journal of Fluid Mechanics*, 670, 204–213.
10. Iaccarino, G., Shaqfeh, E. S., & Dubief, Y. (2010). Reynolds-averaged modeling of polymer drag reduction in turbulent flows. *Journal of Non-Newtonian Fluid Mechanics*, 165(7-8), 376–384.
9. Dubief, Y., Terrapon, V. E., White, C. M., Shaqfeh, E. S., Moin, P., & Lele, S. K. (2005). New answers on the interaction between polymers and vortices in turbulent flows. *Flow, turbulence and combustion*, 74(4), 311–329.
8. Dimitropoulos, C. D., Dubief, Y., Shaqfeh, E. S., Moin, P., & Lele, S. K. (2005). Direct numerical simulation of polymer-induced drag reduction in turbulent boundary layer flow. *Physics of Fluids*, 17(1), 011705.
7. Dubief, Y., White, C. M., Terrapon, V. E., Shaqfeh, E. S., Moin, P., & Lele, S. K. (2004). On the coherent drag-reducing and turbulence-enhancing behaviour of polymers in wall flows. *Journal of Fluid Mechanics*, 514, 271–280.
6. Terrapon, V., Dubief, Y., Moin, P., Shaqfeh, E. S., & Lele, S. K. (2004). Simulated polymer stretch in a turbulent flow using brownian dynamics. *Journal of Fluid Mechanics*, 504, 61–71.
5. Paschkewitz, J., Dubief, Y., Dimitropoulos, C. D., Shaqfeh, E. S., & Moin, P. (2004). Numerical simulation of turbulent drag reduction using rigid fibres. *Journal of Fluid Mechanics*, 518, 281–317.
4. Dubief, Y., & Delcayre, F. (2000). On coherent-vortex identification in turbulence. *Journal of turbulence*, 1(1), 011–011.
3. Lesieur, M., Comte, P., Dubief, Y., Lamballais, E., Métais, O., & Ossia, S. (2000). From two-point closures of isotropic turbulence to les of shear flows. *Flow, turbulence and combustion*, 63(1-4), 247–267.
2. Djenidi, L., Dubief, Y., & Antonia, R. (1997). Advantages of using a power law in a low $r\theta$ turbulent boundary layer. *Experiments in fluids*, 22(4), 348–350.
1. Dubief, Y., Djenidi, L., & Antonia, R. (1997). The measurement of $\partial u/\partial y$ in a turbulent boundary layer over a riblet surface. *International journal of heat and fluid flow*, 18(2), 183–187.

Reports

8. Dubief, Y., Terrapon, V. E., & Soria, J. (2012). Analysis of transitional polymeric flows and elastic instabilities. In *2012 ctr summer program* (p. 55-64). Stanford, CA.
7. Dubief, Y., White, C. M., Shaqfeh, E. S. G., & Terrapon, V. E. (2010). Polymer maximum drag reduction: A unique transitional state. In *Annual research briefs* (p. 395-404). Stanford, CA.
6. Crocker, R., & Dubief, Y. (2010). Numerical study of turbulence over a receding wall by controlled and thermal ablation. In *Proceedings of the summer program* (Vol. 395).
5. Dubief, Y., Iaccarino, G., & Lele, S. (2004). A turbulence model for polymer flows. In *Annual research briefs* (p. 63-73). Stanford, CA.
4. Moreau, R., Dubief, Y., & Knaepen, B. (2004). Hartmann effect on mhd turbulence in the limit $rm \ll 1$. In *2010 ctr summer program* (p. 99-107). Stanford, CA.
3. Dubief, Y., White, C. M., Terrapon, V. E., Shaqfeh, E. S., Lele, S. K., & Moin, P. (2003). Numerical simulation of high drag reduction regime in polymer solutions (keynote). In *Asme/jsme 2003 4th joint fluids summer engineering conference* (pp. 713-720).
2. Dubief, Y. (2002). Numerical simulation of turbulent polymer solutions. *Center for Turbulence Research Annual Briefs*, 1-12.
1. Dubief, Y., & Lele, S. (2001). Direct numerical simulation of polymer flow. *Center for Turbulence Research: Annual Research Briefs*, 197-208.

Synergistic Activities

1. Collaborations for high-fidelity, multi-physics flow solvers on unstructured grids with CO-RIA and structured grids with Cornell University.
2. Faculty affiliation with the Complex Systems Center and the Materials Science Program at the University of Vermont
3. Reviewer for PNAS, Physics Letters, Journal of Fluids Mechanics, Physics of Fluids, Experiments in Fluids, Journal of Turbulence, Journal of Non-Newtonian Fluid Mechanics, Journal of Computational Physics.
4. Participant of the Advanced Engine Combustion Progress Review meeting for the past three years. Meetings are held yearly in the spring at Sandia National Lab Livermore, CA and in Detroit in the Summer. Meetings are organized by DoE and involved the main automotive and construction US companies.
5. Creation of python-based learning experience for undergraduate heat transfer and computational fluid dynamics engineering students. <https://github.com/yvesdubief/>

Conferences abstracts and presentations

1. Integral Method for the Assessment of U-RANS Effectiveness in Non-Equilibrium Flows and Heat Transfer. I. Pond, A. Ebadi, Y. Dubief and C.M. White. 68th Annual Meeting of the APS Division of Fluid Dynamics, November 22-24, 2015; Boston, Massachusetts
2. Elasto-Inertial Turbulence: From Subcritical Turbulence to Maximum Drag Reduction. Y. Dubief, S. Sid, R. Eagan and V. E. Terrapon. 68th Annual Meeting of the APS Division of Fluid Dynamics, November 22-24, 2015; Boston, Massachusetts

3. Effects of Natural Convection on the Near-Wall Turbulence in Unstably Stratified Turbulent Channel Flows. S. Sid, V. E. Terrapon and Y. Dubief. 68th Annual Meeting of the APS Division of Fluid Dynamics, November 22-24, 2015; Boston, Massachusetts
4. Transport of heat and momentum in oscillatory wall-bounded flow. A. Ebadi, D. Biles, C. M. White, I. Pond and Y. Dubief. 68th Annual Meeting of the APS Division of Fluid Dynamics, November 22-24, 2015; Boston, Massachusetts
5. Geometrical Scaling of an Ablative Bluff Body under Different Outer Flow Velocity and Temperature Configurations. M. Allard, C. W. White and Y. Dubief. 68th Annual Meeting of the APS Division of Fluid Dynamics, November 22-24, 2015; Boston, Massachusetts
6. Simulation of elastic and elasto-inertial turbulence in straight channel flows. Y. Dubief, V. E. Terrapon and S. Sid. 67th Annual Meeting of the APS Division of Fluid Dynamics, November 23?25, 2014; San Francisco, California
7. Direct numerical simulations of mixed convection in a turbulent channel flow. S. Sid, V. E. Terrapon and Y. Dubief. 67th Annual Meeting of the APS Division of Fluid Dynamics, November 23?25, 2014; San Francisco, California
8. Properties of the Mean Momentum Balance in Polymer Drag Reduced Channel Flow. C. W. White, Y. Dubief and J. Klewicki. 67th Annual Meeting of the APS Division of Fluid Dynamics, November 23?25, 2014; San Francisco, California
9. An Integral Method to Evaluate Wall Heat Flux in Oscillatory Wall-Bounded Flow. A. Edabi, C. M. White, I. Pond and Y. Dubief. 67th Annual Meeting of the APS Division of Fluid Dynamics, November 23?25, 2014; San Francisco, California
10. Investigation of an Ablative Body under Different Flow Configurations. M. Allard, C. M. White, R. Crocker and Y. Dubief. 67th Annual Meeting of the APS Division of Fluid Dynamics, November 23?25, 2014; San Francisco, California
11. Ablation patterns driven by simple flows. R. Crocker, M. Allard., Y. Dubief and C. M. White. 66th Annual Meeting of the APS Division of Fluid Dynamics, November 24?26, 2013; Pittsburgh, Pennsylvania
12. Characterization of the Flow Field Over an Ablative Surface. M. Allard, C. M. White and Y. Dubief. 66th Annual Meeting of the APS Division of Fluid Dynamics, November 24?26, 2013; Pittsburgh, Pennsylvania
13. Elasto-Inertial Turbulence in polymeric flows. V. E. Terrapon, Y. Dubief and J. Soria. 66th Annual Meeting of the APS Division of Fluid Dynamics, November 24?26, 2013; Pittsburgh, Pennsylvania
14. Boundary conditions for coupling molecular dynamics simulations to continuum simulations. L. Herdman and Y. Dubief. 66th Annual Meeting of the APS Division of Fluid Dynamics, November 24?26, 2013; Pittsburgh, Pennsylvania
15. A new state of turbulence: Elasto-inertial turbulence. Y. Dubief, D. Samanta, M. Hölzner, C. Schafer, A. Morozov, C. Wagner, B. Hof, V. Terrapon, J. Soria. 65th Annual Meeting of the APS Division of Fluid Dynamics. November 18-20, 2012; San Diego, California
16. The onset of elasto-inertial turbulence. B. Hof, Y. Dubief, D. Samanta, M. Hölzner, C. Schafer, A. Morozov, C. Wagner. J. M. Gallardo Ruiz. 65th Annual Meeting of the APS Division of Fluid Dynamics. November 18-20, 2012; San Diego, California
17. Studying the Topology and Dynamics of Elasto-inertial Channel Flow Turbulence Using the Invariants of the Velocity Gradient Tensor and Dynamic Mode Decomposition. J. Soria, V. Terrapon, Y. Dubief. 65th Annual Meeting of the APS Division of Fluid Dynamics. November 18-20, 2012; San Diego, California
18. Mechanics and characteristics of transition to turbulence in elasto-inertial turbulence. V. Terrapon, J. Soria, Y. Dubief. 65th Annual Meeting of the APS Division of Fluid Dynamics. November 18-20, 2012; San Diego, California
19. A Numerical study of ablative flow driven by thermodynamics and kinetics, R. Crocker, Y. Dubief, C. White. 65th Annual Meeting of the APS Division of Fluid Dynamics. November 18-20, 2012; San Diego, California

20. Preliminary Results in an Ablation Wind Tunnel. M. Allard, C. White, Y. Dubief. 65th Annual Meeting of the APS Division of Fluid Dynamics. November 18-20, 2012; San Diego, California
21. Dynamic evolution of a flow to localized, kinetics-driven ablation or coagulation. D. Hagan, R. Crocker, Y. Dubief. 65th Annual Meeting of the APS Division of Fluid Dynamics. November 18-20, 2012; San Diego, California
22. Re-examing the logarithmic dependence of the mean velocity distribution in polymer drag reduced wall-bounded flow. C. White, J. Klewicki, Y. Dubief. 64th Annual Meeting of the APS Division of Fluid Dynamics. November 20-22, 2011; Baltimore, Maryland
23. A universal law of the elasticity of multilamellar lipid membranes under compression. Y. Dubief, L. Cowley. 64th Annual Meeting of the APS Division of Fluid Dynamics. November 20-22, 2011; Baltimore, Maryland
24. Elastic turbulence in high Reynolds number polymer drag reduced flows. Y. Dubief, C. White. 64th Annual Meeting of the APS Division of Fluid Dynamics. November 20-22, 2011; Baltimore, Maryland
25. The Interaction Between Non-Equilibrium Turbulence and a Thermally Ablative Surface. R. Crocker, Y. Dubief. 64th Annual Meeting of the APS Division of Fluid Dynamics. November 20-22, 2011; Baltimore, Maryland
26. On the correspondence between polymer-modified turbulence states and transitional states in Newtonian flows. Y Dubief, CM White. 63rd Annual Meeting of the APS Division of Fluid Dynamics. November 21-23, 2010; Long Beach, California
27. Direct Numerical Simulation of low-temperature ablation by turbulent flows. R. Crocker, Y. Dubief, CM White, 63rd Annual Meeting of the APS Division of Fluid Dynamics. November 21-23, 2010; Long Beach, California
28. Analysis of the Mean Momentum Balance in Polymer Drag Reduced Turbulent Boundary Layers. CM White, M Blake, J Klewicki, Y Dubief. 63rd Annual Meeting of the APS Division of Fluid Dynamics. November 21-23, 2010; Long Beach, California
29. Mechanical response of solutions of phospholipids to anisotropic compression. Y Dubief, L. Cowley. 63rd Annual Meeting of the APS Division of Fluid Dynamics. November 21-23, 2010; Long Beach, California
30. Mechanical role of phospholipid bilayers in synovial joint lubrication, R. Packard, Y. Dubief, L. Cowley. 62nd Annual Meeting of the APS Division of Fluid Dynamics, November 22-24, 2009; Minneapolis, Minnesota
31. Direct numerical simulation of surface ablation by turbulent convection, R. Crocker, Y. Dubief, CM White. 62nd Annual Meeting of the APS Division of Fluid Dynamics, November 22-24, 2009; Minneapolis, Minnesota
32. Turbulent Thermal Convection with Polymer Additives, Y. Dubief. 61st Annual Meeting of the APS Division of Fluid Dynamics. November 23-25, 2008; San Antonio, Texas
33. Investigation of large fluctuations of scalar dissipation related to coherent vortices and flow topology. B. Rollin, Y. Dubief. 60th Annual Meeting of the Division of Fluid Dynamics. November 18-20, 2007; Salt Lake City, Utah
34. Numerical simulation of slug formation in micro-channels. S. Manchu, Y Dubief, W Louisos, T Harris, D Hitt. 60th Annual Meeting of the Division of Fluid Dynamics. November 18-20, 2007; Salt Lake City, Utah
35. Lessons learned from polymer drag reduction on near-wall turbulence. Y Dubief. 60th Annual Meeting of the Division of Fluid Dynamics. November 18-20, 2007; Salt Lake City, Utah
36. Dynamics of Passive Scalar Gradients In A Turbulent Kolmogorov Flow. B. Rollin and Dubief, Y. 59th meeting of the Division of Fluid Dynamics, American Physical Society, Tampa bay, Florida, Nov 19-21, 2006.

37. Effects of polymers on near-wall vortices. Y. Dubief, S. K. Lele, P. Moin and E. S. G. Shaqfeh, 58th Annual Meeting of the Division of Fluid Dynamics, American Physical Society, San Diego, CA. 2005
38. The mechanism of polymer drag reduction derived from numerical simulations. Y. Dubief, V. E. Terrapon, E. S. G. Shaqfeh and P. Moin. 58th Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Chicago, IL. 2005
39. On the dynamics of turbulent polymer flows at high drag reduction. Y. Dubief, V. E. Terrapon, E. S. G. Shaqfeh and P. Moin. 57th Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Seattle, WA. 2004.
40. Mechanism of the effect of polymers on turbulent structures in drag reduced flows. Y. Dubief, V. E. Terrapon, P. Moin, E. S. G. Shaqfeh and S. K. Lele, 56th Annual Meeting of the Division of Fluid Dynamics, American Physical Society, New York, NY. 2003
41. Modification of near-wall coherent structures un polymer drag reduced flow: simulation. Y. Dubief, C. M. White, E. S. G. Shaqfeh, P. Moin and S. K. Lele, 55th Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Dallas, TX. 2002.

Invited talks

1. “Chaos, permanence and symmetry in two dimensional elasto-inertial turbulence”, Fluid Mechanics Seminar. March 13, 2020!. Department of Applied Mathematics and Theoretical Physics (DATMP), University of Cambridge, UK.
2. “Key energy transfer mechanisms and topological features of elasto-inertial turbulence and elastic turbulence”, Workshop on Elastic Turbulence. April 9-11, Princeton Center for Theoretical Science, Princeton, CT, 2018.
3. Invited plenary speaker: Dynamics of Non-Newtonian Fluids: Insights from Numerical Simulation. 42nd Leeds-Lyon Symposium of Tribology, “Surface and Interfaces : Mysteries across the scales”. September 7-9, 2015, Lyon, France
4. Elasto-Inertial Turbulence is the Ultimate Maximum Drag Reduction State. Euromechanical Colloquium on Subcritical Transition, Cargèse, France. May 5-9, 2014
5. Is Elasto-Inertial Turbulence the Ultimate Maximum Drag Reduction State. “Turbulence and Amorphous Materials” workshop organized by the Weizmann Institute. November 08-15, 2013, Eilat, Israel
6. Elasto-Inertial Turbulence, Stanford University, July 2013
7. A new state of turbulence: Elasto-Inertial Turbulence, University of New Hampshire, October 2012
8. Polymer drag reduction, University of New Hampshire, April 2010
9. From the mechanism of drag reduction by polymer additives to the modeling of the small scales of turbulent scalar transport. Laboratoire des Ecoulements Géophysiques et Industriels. INPG. Grenoble, France, May 2008
10. Polymer drag reduction: from DNS to RANS. University of California, Los Angeles. Los Angeles, California, 2004.
11. Understanding and modeling of drag reduction in turbulent flows by polymer injection. Université Libre de Bruxelles. Brussels, Belgium, 2004.
12. New answers on the interaction between polymers and vortices in turbulent flows. Conference in honor of Prof. Bob Antonia’s 60th birthday. Newcastle, Australia, 2004.

Current Funding

Title	Active turbulence from polymer additives: Theory, modeling and high fidelity simulations
Budget	\$300,000
Source	National Science Foundation
Location	University of Vermont
Duration	6/1/2018 - 5/31/2021
Role	PI

Title	Collaborative Research: Novel Measurement of Shear Strength Evolution in Liquefied Soil and Calibration of a Fluid Dynamics-based Constitutive Model for Flow Liquefaction
Budget	\$304,845
Source	National Science Foundation
Location	University of Vermont
Duration	09/01/2017 - 08/31/2020
Role	co-PI (PI: Mandar Dewoolkar)

Title	Critical Gas Surface Interaction Problems for Atmospheric Entry
Budget	\$750,000
Source	NASA
Location	University of Vermont
Duration	6/1/18-5/31/21
Role	Co-I (PI: Darren Hitt)

Title	Search for Direct Relation between Elastic and Turbulent Drag Reduction
Budget	\$150,000
Source	Binational Science Foundation
Duration	09/01/2017-8/31/2020
Location	University of Vermont
Role:	PI

Past Funding

Title	Flexible Thermal Protection Systems: Materials Characterization and Performance in Hypersonic Atmospheric Entry
Budget	\$750,000
Source	NASA
Location	University of Vermont
Duration	8/1/14-7/31/18
Role	Co I (Administrative PI: Darren Hitt, Scientific PI: Frederic Sansoz)

Title	Analysis and Characterization of Trauma-Induced Coagulopathy
Budget	\$23,999,991
Source	NIH RFA-HL-13-025
Location	University of Vermont
Duration	9/1/13-8/31/18
Role	Co-investigator (PI: Ken Mann)

Title	Collaborative Research: A Comprehensive Investigation of Unsteady Reciprocating Effects on Near-Wall Heat Transfer in Engines
Budget	\$192,182
Source	NSF/DOE Advanced Combustion Engines
Duration	09/15/2013-8/30/2016
Location	University of Vermont
Role	PI

Title	Prediction and monitoring of ablation of thermal protective systems under atmospheric reentry conditions
Budget	\$750,000
Source	NASA NNX11AM07A
Location	University of Vermont
Duration	9/1/11-5/31/16
Role	Scientific PI(Administrative PI: Darren Hitt)
Title	Surface dependent reactions in thrombosis and thrombolysis
Budget	\$9,542,080
Source	NIH -P01 HL 46703
Location	University of Vermont
Duration	9/1/07-7/31/12
Role	Co-I (PI: Ken Mann)
Title	Collaborative research: Fundamental Investigation of Turbulent Ablation
Budget	\$204,946
Source	NSF-CBET-0967857
Location	University of Vermont
Duration	5/1/10-4/30/14
Role	PI.
Title	Investigation of critical aerothermodynamic phenomena of hypersonic vehicles
Budget	\$750,000
Source	NASA NNX07AT56A
Location	University of Vermont
Duration	6/1/08-5/31/11
Role	Co-I (Administrative PI: William Lakin, Scientific PI: Doug Fletcher)
Title	Innovative Fund: A New Hypothesis for Synovial Joint Lubrication and its Application to Orthopedic Prostheses
Budget	\$12,000
Source	Vermont EPSCOR
Location	University of Vermont
Duration	01/1/2009 to 6/30/2009
Role	PI
Title	Experimental design and multi-scale modeling of self-assembled nanostructures for hydrogen generation and utilization
Budget	\$175,000
Source	Department of Transportation
Location	University of Vermont
Duration	6/1/07-5/31/09
Role	Co I (PI: Walter Varhue)
Title	A dispersed monopropellant microscale approach for discrete satellite micro-propulsion
Budget	\$724,859
Source	AFSOR DoD
Location	University of Vermont
Duration	6/1/06-5/31/09
Role	Co I (PI: Darren Hitt)

Collaborators

Name	Field	Affiliation	Relationship
Vincent Moureau	Computational Fluid Dynamics	CORIA	Collaborator
Guillaume Balarac	Computational Fluid Dynamics	LEGI	Collaborator
Olivier Desjardins	Computational Fluid Dynamics	Cornell University	Collaborator
Christopher White	Turbulence	University of New Hampshire	Collaborator
Vincent Terrapon	Elasto-Inertial Turbulence	University of Liege	Collaborator
Yves Berthier	Tribology	INSA Lyon	Collaborator
Doug Fletcher	Plasma Dynamics	University of Vermont	Collaborator
Björn Hof	Elasto-Inertial Turbulence	IST Austria	Collaborator
Victor Steinberg	Elasto-Inertial Turbulence	Weissmann Institute of Science	Collaborator
Rich Kerswell	Elqsto-Inertial Turbulence	University of Cambridge	Collaborator
Julio Soria	Turbulence	Monash University	Collaborator

PhD Advisor and Postdoctoral Sponsor

PhD: (1) Prof. Marcel Lesieur, LEGI, INPG, Grenoble France

Postdoctoral Sponsor: (1) Prof. Parviz Moin, Stanford University, CA

Graduate students and postdoc mentoring

Completed PhD: Bertrand Rollin, Laura Haynes, Ryan Crocker, Max Dougherty, Daniel Hagan

Completed MS: Leonie Cowley, Daniel Sturnick, Ian Pond, Andy Reagan

Completed Postdoctoral Fellows: Liv Herdmann

Current: 1 MSc Sam Whitemore, Fuqian Yu, 1 PhD Atena Fahrangian

Defense Committees

36. Habilitation à diriger des Recherches: Dr. Ana-Maria. “Reponses Biologiques Aux Sollicitations Tribologiques.” INSA-Lyon, Lyon, France. 2019
35. PhD: David Hinkley*. “Multi-Objective Optimization Mission Design for Small-Body Coverage Missions”. University of Vermont, Burlington, USA. 2019
34. PhD: Drummond Biles. “Experimental Investigations of Boundary Layers: From High Reynolds Number to Non-Equilibrium”. University of New Hampshire, Durham, USA. 2019
33. PhD: Michael Allard. “Interdependence Of Flow And Shape Morphological Dynamics For Flow Induced Erosion Of Bluff Bodies”. University of New Hampshire, Durham, USA. 2019
32. MS: Lukas Adamowicz. “Functional Rotation Axis Based Approach for Estimating Hip Joint Angles Using Wearable Inertial Sensors: Comparison to Existing Methods”. University of Vermont, Burlington, USA. 2019.
31. PhD: Jennifer Etter*. “Development And Characterization Of Multi-Crosslinking Injectable Hydrogels For Use In Cell And Drug Delivery”, University of Vermont, Burlington, USA, 2019

30. MS: Roland Herrmann-Stanzel. “Energy Accommodation from Surface Catalyzed Reactions in Air Plasmas”. University of Vermont, Burlington, USA, 2019
29. MS: James Reilly. “Design, Prototyping And Fabrication Of Powder Spray Device For Dehydrated Biological Particulates”. University of Vermont, Burlington, USA, 2019
28. MS: Robert Farrell. “Rotating Magnetometry For Terrestrial And Extraterrestrial Sub-surface Explorations”. University of Vermont, Burlington, USA, 2018
27. MS: **Donald Bernard**. “Optimization of Turbulent Prandtl Number in Turbulent, Wall Bounded Flows”, University of Vermont, Burlington, USA, 2018
26. PhD: Farzad Farajidizaji. “Numerical Modeling Of Collision And Agglomeration Of Adhesive Particles In Turbulent Flows”. University of Vermont, Burlington, USA, 2018
25. PhD: **Daniel Hagan**. “Large Eddy Simulation of Oscillatory Flow over a Mobile Rippled Bed using an Euler-Lagrange Approach”. University of Vermont, Burlington, USA, 2018
24. MS: Enrique Angola. “Novelty Detection Of Machinery Using A Non-Parametric Machine Learning Approach”. University of Vermont, Burlington, USA, 2018
23. PhD: Nicolas Legrand. “Numerical and Modeling Methods for Multi-Level Large Eddy Simulations of Turbulent Flows in Complex Geometries”. CORIA, Rouen, France. 2017
22. PhD: James Montague. “Assessing The Probability Of Fluid Migration Caused By Hydraulic Fracturing; And Investigating Flow And Transport In Porous Media Using MRI”, University of Vermont, Burlington, USA, 2017
21. MS: Michael A. Karasinski. “Manufacturing Microfluidic Flow Focusing Devices For Stimuli Responsive Alginate Microsphere Generation And Cell Encapsulation”. University of Vermont, Burlington, USA, 2017
20. MS: Nicholas Martin. “Steady State Simulation of Pyrolysis Gases in an Inductively Coupled Plasma Facility”. University of Vermont, Burlington, USA, 2017
19. PhD: Daniel Saunders. “Wind Turbine Wake Interactions - Characterization of Unsteady Blade Forces and the Role of Wake Interactions in Power Variability Control”. University of Vermont, Burlington, USA, 2017
18. PhD: Minh Quan Nguyen. ”Simulation numérique des interactions fluides-polymères dans le cadre d’une turbulence homogène isotrope”. Ecole Centrale de Lyon, Lyon, France. 2016.
17. MS: Luke Allen. “Assessment Of Surface-Catalyzed Reaction Products From High Temperature Materials In Plasmas”. University of Vermont, Burlington, USA, 2016
16. PhD: Lola Guedot, “Développement d’outils numériques pour la caractérisation des grandes structures tourbillonnaires dans les brûleurs aéronautiques. Application aux systèmes d’injection multi-points”, CORIA, Rouen, France. 2016
15. PhD: **Maximilian Dougherty**. “Numerical Simulations of Reacting Flow in an Inductively Coupled Plasma Torch”. University of Vermont, Burlington, USA, 2015
14. MS: **Ian Pond**. “Toward an Understanding of the Breakdown of Heat Transfer Modeling in Reciprocating Flows”. University of Vermont, Burlington, USA, 2015
13. PhD: **Ryan Crocker**. “Direct Numerical Simulation Of Ablative Boundaries In Turbulent And Laminar Flows”. University of Vermont, Burlington, USA, 2015

12. PhD: Andrew Lutz. “Experimental Investigation And Analysis Of High-Enthalpy Nitrogen Flow Over Graphite”. University of Vermont, Burlington, USA, 2015
11. MS: **Daniel Hagan**. “Numerical study of particle bed scour by vortices”. University of Vermont, Burlington, USA, 2015
10. MS: Patrick Nelson Charron. “Burst Pressure Properties and Ex Vivo Analysis of Alginate-Based Hydrogels for Tissue Sealant Applications”. University of Vermont, Burlington, USA, 2015
9. MS: Melissa Faletra. “Segregation of Particles of Variable Size and Density in Falling Suspension Droplets”. University of Vermont, Burlington, USA, 2014
8. MS: William Turner. “Understanding and improving microbial biofuel tolerance as a result of efflux pump expression through genetic engineering and mathematical modeling”. University of Vermont, Burlington, USA, 2014
7. MS: Christopher Ghazi. “Measurement of Fluid and Particle Transport through Narrow Passages”. University of Vermont, Burlington, USA, 2014
6. MS: Alice Newman. “Strain localization and exhumation of the lower crust: A study of the three-dimensional structure and flow kinematics of central Fiordland, New Zealand”. University of Vermont, Burlington, USA, 2014
5. MS: Kyle Sala. “Analysis of Stochastic Methods for Predicting Particle Dispersion in Turbulent Flows”. University of Vermont, Burlington, USA, 2013
4. PhD: **Laura Haynes**. “The role of flow in regulating prothrombinase complex”. University of Vermont, Burlington, USA, 2012
3. MS: **Leonie Cowley**. “Mechanical Role of Phospholipi Bilayers in Boundary Lubrication of Synovial Joints”. University of Vermont, Burlington, USA, 2011
2. MS: **Daniel Sturnick**. “The relationship between knee joint geometry and risk of suffering anterior cruciate injury: a prospective study with a nested case-control analysis”. University of Vermont, Burlington, USA, 2013
1. PhD: **Bertrand Rollin**. “On the Influence of Large Scale Forcing and Flow Topology on the Dynamics of Small-Scale Turbulent Transport”,

Bold: Advisor or co-advisor of the student. * Acting advisor due to exceptional circumstances

COURSES TAUGHT

1. CE 001 Statics
2. ME 143 Fluid Mechanics
3. ME 144 Heat Transfer
4. ME 209 Bio Fluid Transport
5. ME 237 Turbulence
6. ME 249 Computational Fluid Engineering
7. ME 350 Multiscale Modeling
8. ME 395 Advanced Computational Fluid Dynamics
9. ME 395 Advanced Numerical Methods