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EDITORIAL

Introduction to Topical Issue on Extreme Flows

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The Extreme Flows Workshop was held in Princeton in May 2014 to honor the contributions by Professor Lex Smits to the field of fluid dynamics. His work was represented through a mix of oral and poster presentations, and discussions covered the state of the art and challenges associated with fundamental research over a range of Mach and Reynolds numbers, energy harvesting, biomimetic flows, vortex dynamics and the development of instrumentation and analysis techniques. The workshop captured Lex's holistic approach to research, the breadth of his contributions and the synergy he has achieved between scientific advances and the many developments in facilities, instrumentation and techniques.

This article belongs to a Topical Collection of articles entitled Extreme Flow Workshop 2014. Guest editors: I. Marusic and B. J. McKeon.

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The papers (all have been peer reviewed) in this topical issue are contributions from some of Lex's students, collaborators and friends. They cover characterization of vorticity transport in unsteady aerodynamic configurations (Dunne and McKeon 2015; Huang and Green 2015; Panah et al. 2015; Williams et al. 2015a, b); scaling of the inertial region and an air–water outer interface in canonical wall turbulence up to high Reynolds numbers (Chung et al. 2015; Madad et al. 2015); instrument development that enables turbulence and heat flux measurements in the presence of small viscous scales (Fan et al. 2015; Williams et al. 2015c); energy harvesting in turbulence (Danesh-Yazdi et al. 2015); and large-scale unsteadiness of reattaching, compressible, turbulent shear layers (Poggie and Leger 2015).

We believe that this issue not only offers an interesting reflection on the work at the extremes of fluid mechanics and conditions in between, but also reflects the breadth and depth of Lex's interests. The fluid mechanics community has greatly benefited from his vision, leadership, generosity and, of course, his scientific contributions. We are grateful for his generous collaborations and mentorship and look forward to further interactions.

References

Chung D, Marusic I, Monty JP, Vallikivi M, Smits AJ (2015) On the universality of inertial energy in the log layer of turbulent boundary layer and pipe flows. Exp Fluids 56(141):1–10

Danesh-Yazdi AH, Goushcha O, Elvin N, Andreopoulos Y (2015) Fluidic energy harvesting beams in grid turbulence. Exp Fluids 56(161):1–14

Dunne R, McKeon BJ (2015) Dynamic stall on a pitching and surging airfoil. Exp Fluids 56(157):1–15

Fan Y, Arwatz G, Buren TWV, Hoffman DE, Hultmark M (2015) Nanoscale sensing devices for turbulence measurements. Exp Fluids 56(138):1–13

Huang Y, Green MA (2015) Detection and tracking of vortex phenomena using Lagrangian coherent structures. Exp Fluids 56(147):1–12

Madad R, Elsnab J, Chin C, Klewicki J, Marusic I (2015) An investigation of channel flow with a smooth airwater interface. Exp Fluids 56:1–11

Panah AE, Akkala JM, Buchholz JHJ (2015) Vorticity transport and the leading-edge vortex of a plunging airfoil. Exp Fluids 56(160):1–15

Poggie J, Leger T (2015) Large-scale unsteadiness in a compressible, turbulent reattaching shear layer. Exp Fluids 56:1–12

Williams DR, An X, Iliev S, King R, Reiner F (2015a) Dynamic hysteresis control of lift on a pitching wing. Exp Fluids 56(112):1–12

Williams DR, An X, Iliev S, King R, Reißner F (2015b) Erratum to: Dynamic hysteresis control of lift on a pitching wing. Exp Fluids 56(155):1

Williams O, Buren TV, Smits AJ (2015c) A new method for measuring turbulent heat fluxes using PIV and fast-response cold-wires. Exp Fluids 56(142):1–10