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Colloquium Thermo- and Fluid Dynamics

Optical measurement techniques in emerging thermal energy systems

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The fields of thermal science and optics are fundamentally linked by the fact that all bodies above 0 K must emit electromagnetic radiation. Optical radiation plays an important role in many emerging energy technologies including thermo-photovoltaics (TPV), concentrating solar thermal (CST), and radiative cooling (RC). To enable accurate characterization of these systems, novel techniques to measure thermal and optical properties and energy flows are required. This talk will explore several techniques to accurately measure heat and light transport in energy conversion devices and thermal energy systems. In particular, optical measurement techniques for measuring temperature, radiant heat flux, and radiative properties (e.g. emissivity), will be presented. The full development cycle of these techniques – from basic theory and laboratory demonstration to industrial application – will be highlighted. Practical applications include precision high-temperature thermal imaging, irradiance mapping, and spectral radiative property measurement.

Thomas Cooper is an Associate Professor in the Department of Mechanical Engineering at York University, in Toronto, Canada. There he leads the CooperLab, which conducts fundamental and applied research which spans the fields of thermal science, optics, and materials engineering. His current research focuses on developing processes, materials, and devices for converting sunlight into heat, electricity, and clean water, also touching on complementary fields including energy storage, advanced thermal insulation, and thermal characterization techniques. Dr. Cooper received his Dr. sc. and M. Sc. from ETH Zurich in 2014 and 2010 respectively, and his B.A.Sc. from the University of Toronto in 2008. Prior to joining York University, Dr. Cooper was a postdoc at MIT.

Date: Monday, 25 November 2024
Time: 16:15 - 17:15h
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