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Michigan Institute for Plasma Science and Engineering

Special MIPSE Seminar

Wednesday
October 4, 2023
3:00 pm
Room 1010 Dow

Dr. Trevor Lafleur

University of New South Wales Canberra, Australia

Plasmas for Propulsion: Alternative Propellants and (Some) Emerging Concepts

The space industry is currently experiencing unprecedented growth with estimates suggesting that between 20,000 – 300,000 satellites could be launched in the next ten years. The majority of such satellites will require some form of propulsion to enable mission success and ensure a sustainable space environment: particularly within the context of space domain awareness and space traffic management concerns. Electric propulsion systems are an attractive choice because of their high performance, but evolving mission needs, and various market pressures, have created several challenges associated with conventional propellants and existing technologies. This talk will explore emerging alternative propellants for important plasma-based propulsion systems such as gridded ion and Hall thrusters, and give an overview of the current state-of-the-art. It will also look at a novel electrothermal propulsion system that uses an inductive plasma to superheat propellant, and the potential compatibility of such an electrodeless discharge with a wide range of alternative propellants. Finally, we end by considering an innovative propellantless propulsion concept that exploits the natural ionospheric plasma around the Earth.

About the Speaker: Trevor joined the School of Engineering and Technology at the University of New South Wales (UNSW) Canberra in early 2023 where he is also affiliated with the space research group, UNSW Canberra Space. Before this, Trevor was a principal engineer at ThrustMe – a French deep-tech company developing propulsion systems for satellites – and founder of PlasmaPotential – a company providing technical consulting to clients in the semiconductor and space industries. Trevor received his PhD in plasma physics from the Australian National University in 2011 and has subsequently worked with several institutes including Ecole Polytechnique, ONERA – The French Aerospace Lab, and the French Space Agency (CNES). His research focuses on the application of plasmas to different ground- and space-based applications, as well as understanding fundamental plasma processes such as collisions and instabilities.