Aerospace and Mechanical Engineering Seminar

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Hosted by Dr. Jesse Little, Associate Professor, AME Search Committee Chair
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Plasma Modeling for CFD: Perspectives and Retrospectives

Abstract: The interaction between non-thermal plasmas and turbulent flows (as occurs in plasma flow control, plasma-assisted combustion, or plasma-based fuel reforming) has been so far a major challenge to simulate numerically due to the large variation in physical time scales involved: while electrons travel at velocities as high as millions of meters per second within the sheaths, neutrals and ions travel at velocities 4-6 orders of magnitude lower. This large discrepancy between the time scales has made it difficult to incorporate detailed plasma models within CFD codes for fluid flow. We discuss recent advances in computational plasmadynamics that overcome this hurdle and make addition of a detailed plasma model to a CFD code relatively trouble-free.

Bio: Dr. Bernard Parent obtained his bachelor's degree in Mechanical Engineering at McGill University in 1996, and his PhD at the University of Toronto Institute for Aerospace Studies in 2002. During his PhD, he developed a CFD code to simulate chemically-reacting turbulent flows in scramjets. From 2003 to 2007 he did postdoctoral stays in several locations including Princeton University and the Tokyo Institute of Technology where his research focused on extending his CFD code to handle non-thermal plasma effects. Since 2008, he has been a faculty member at Pusan National University where he has been active in developing numerical methods and plasma models to improve the simulation of plasma flow control, plasma-assisted combustion, and re-entry flows.

Tuesday, Dec. 4, 2018 at 4:00 pm
AME Lecture Hall, Room S212
Refreshments and socializing at 3:45 pm outside S212