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Available MASc research positions:

1- Aerodynamic optimization of inter-turbine ducts on gas-turbine engines – application: small- and medium size turbofan engines
2- Aerodynamic optimization of lobed mixers on gas-turbine engines – application: small and medium size turbofan engines
3- Passive wake control techniques for drag reduction on bluff bodies – application: road transportation
4- Passive control of boundary-layer turbulence for drag and noise reduction (stealth flight) – application: aircraft
5- Physics of heat transfer in channel flows of heated supercritical fluids – application: Generation-IV nuclear reactors

All five projects involve both experimentation and computational modeling.

Experimentation includes design and manufacturing of a test section, setting up of the relevant instrumentation (e.g., pressure probes, pressure-sensitive paint, interferometry, thermal anemometry, laser-based techniques) and data acquisition systems, commissioning of the test setup, development of a test matrix, execution of the measurements, data post-processing, and interpretation of the results.

Computer simulations go well beyond the mere use of a software package. Through such simulations, knowledge is acquired on: (1) the discretization schemes applied to the differential equations being solved and their impact on accuracy and stability; (2) the optimization of the iterative solution algorithm for solution stability and convergence rate; (3) post-processing techniques for effective interpretation of the simulation results.

Learning outcomes:

a) Physics of fluid flows with a focus on flow instabilities and turbulence
b) Instrumentation and measurement techniques
c) Data acquisition and signal processing
d) Numerical solution of partial differential equations
e) Data analysis techniques
f) Engineering design

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