Transitioning to hydrogen based power generation through a novel, fuel-flex, gas turbine injector concept

Ph.D. and Postdoctoral Positions Open

Keywords: turbulent combustion, laser-based diagnostics, DNS, hydrogen, gas turbine combustors

Transitioning to green **hydrogen** in place of natural gas as the fuel of choice for **gas turbine**-based power plants is fast emerging as a feasible solution. To enable this transition, there is great interest at Siemens Energy Canada and the National Research Council Canada (NRC) to develop **fuel flexible nozzles** that can allow seamless operation anywhere on and between 100% hydrogen to 100% natural gas as the gas turbine fuel while ensuring strict operability envelope in terms of emissions, and safe and stable operation. A team from McGill University, Polytechnique Montréal, University of Toronto, Siemens Energy Canada, and the NRC will perform **detailed laser-based measurements** and **direct numerical simulations** on a novel injection concept to identify and understand the operability envelopes achievable. The following positions are to be filled as soon as possible:

PhD1 (McGill): Non-reactive experiments in a model combustor to visualize the fine-grained mixing field and identify parameters controlling the mixing quality. Contact Prof. Bergthorson (jeff.bergthorson@mcgill.ca).

PhD2 (Polytechnique): Reactive experiments in a model combustor to identify the parameters controlling flame dynamics and emissions. Contact Prof. Robert (etienne.robert@polymtl.ca).

PhD3 (UofT and NRC): Flame-wall interaction and stability limits with the novel injection concept. Contact Prof. Chaudhuri (swetaprovo.chaudhuri@utoronto.ca) and Dr. Vena (patrizio.Vena@nrc-cnrc.gc.ca).

Postdoc1 (McGill and Polytechnique): Assist PhD1 and PhD2 with laser-based measurements, design the combustor, and complete the experimental campaign. Contact Prof. Bergthorson and Prof. Robert.

Postdoc2 (NRC): Support PhD3 and lead the flame-wall interaction measurement campaign. Contact Dr. Vena.

Postdoc3 (UofT): Support PhD3 and lead the stability limits investigation, with a focus on dynamic stability. Contact Prof. Chaudhuri.

Postdoc4 (Polytechnique and Siemens Energy Canada): High-fidelity simulations (DNS) and modelling of flame stabilization in the combustor with the novel injection concept. Contact Prof. Savard (bruno.savard@polymtl.ca).

Candidates from underrepresented groups in engineering are highly encouraged to apply. Interested applicants are kindly asked to provide a cover letter, a resume, and copies of transcripts and relevant English proficiency tests (English OR French proficiency is required at Polytechnique Montréal). Full financial support will be provided following standard salaries in the respective institutions and commensurate with experience.