SUMMER UNDERGRADUATE RESEARCH IN ENGINEERING

McGill Faculty of Engineering

General Information Session
January 16 2018

Presented by:

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AGENDA

- Overview of the SURE experience
- Student testimonial
- Application form
- Processing, procedures and selection
- Questions

- The Summer Undergraduate Research in Engineering Program is made possible by the Faculty's generous donors in support of undergraduate student research.
- Approximately 125 students are accepted to this competitive 16-week program each summer.

STUDENT TESTIMONIALS

LABIB E. KALLAS

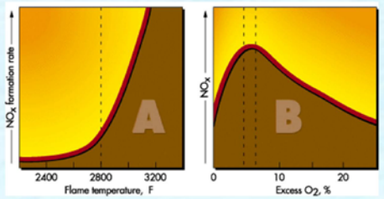
Department: Civil Engineering

Lowering NOX Emissions By Optimizing The Mixing Quality Across A Perforated Plate

Labib Emmanuel Kallas, Professor Susan Gaskin (Department of Civil Engineering And Applied Mechanics)

Introduction

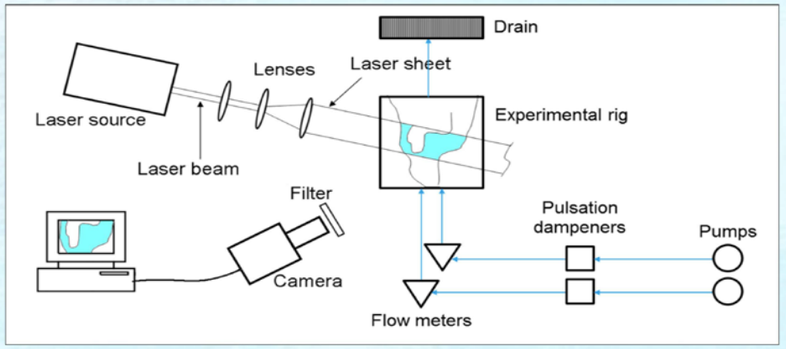
- Nitrogen oxides (NOX) pose significant environmental and human health hazards.
- At high concentrations, nitric oxide (NO) and nitrogen dioxide (NO_2) cause inflammation of the respiratory system and ground level ozone formation which damages vegetation.
- NOX emissions mainly result from the incomplete combustion of fuel and air in engines at high temperatures.

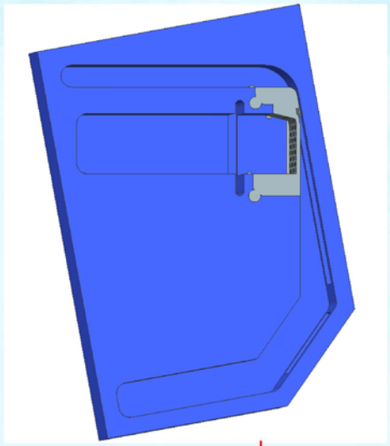


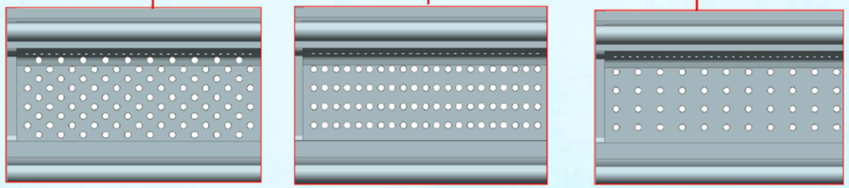
Project Aim

- This project is developed in collaboration with Siemens Canada. The company aims to reduce NOX emissions from an aero-derivative gas turbine used for electricity generation.
- The goal is to optimize the mixing configuration between air and gas by testing several perforated plates through which air flows before mixing with gas. Plate solidity, hole patterns and tapering are to be examined.
- A prototype is built to serve this purpose. Gas and air are simulated using dyed and transparent water respectively and Planar Laser Induced Fluorescence (PLIF) is used to asses the wellness of the mixing.

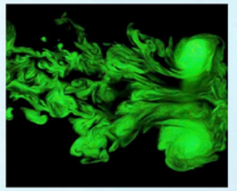
Methodology and Design







Expected Outcomes



While prototype testing has not yet been conducted, previous literature showed promising results.

1) Higher plate solidity causes higher flow turbulence and thus better mixing.

2) Tapered (converging) holes cause better fluid mixing due to shorter jet development lengths and less recirculation zones.

3) Adding small bumps to the plate trips the flow and makes it more turbulent.

Future Perspectives

- Turbulence homogeneity and intensity are important factors that should be considered in the assessment of fluid mixing. Being dependant on the flow's velocity, Particle Image Velocimetry (PIV) is to be considered.
- The optimal mixing chamber length as well as the converging hole's angle could also be areas of further research.

Acknowledgments

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KUAN WEI

Department: Chemical Engineering

PROJECTS/ ABSTRACTS

http://www.mcgill.ca/engineering/current-students/undergraduate/research

AM I ELIGIBLE TO APPLY?

- Full-time students (including international)
- At least Year 1
- CGPA of 3.0 or higher
- Available for 16-week period between May-August

Eligibility: see General Information and FAQ at **http://www.mcgill.ca/engineering/current-students/undergraduate/research**

HOW DO I APPLY?

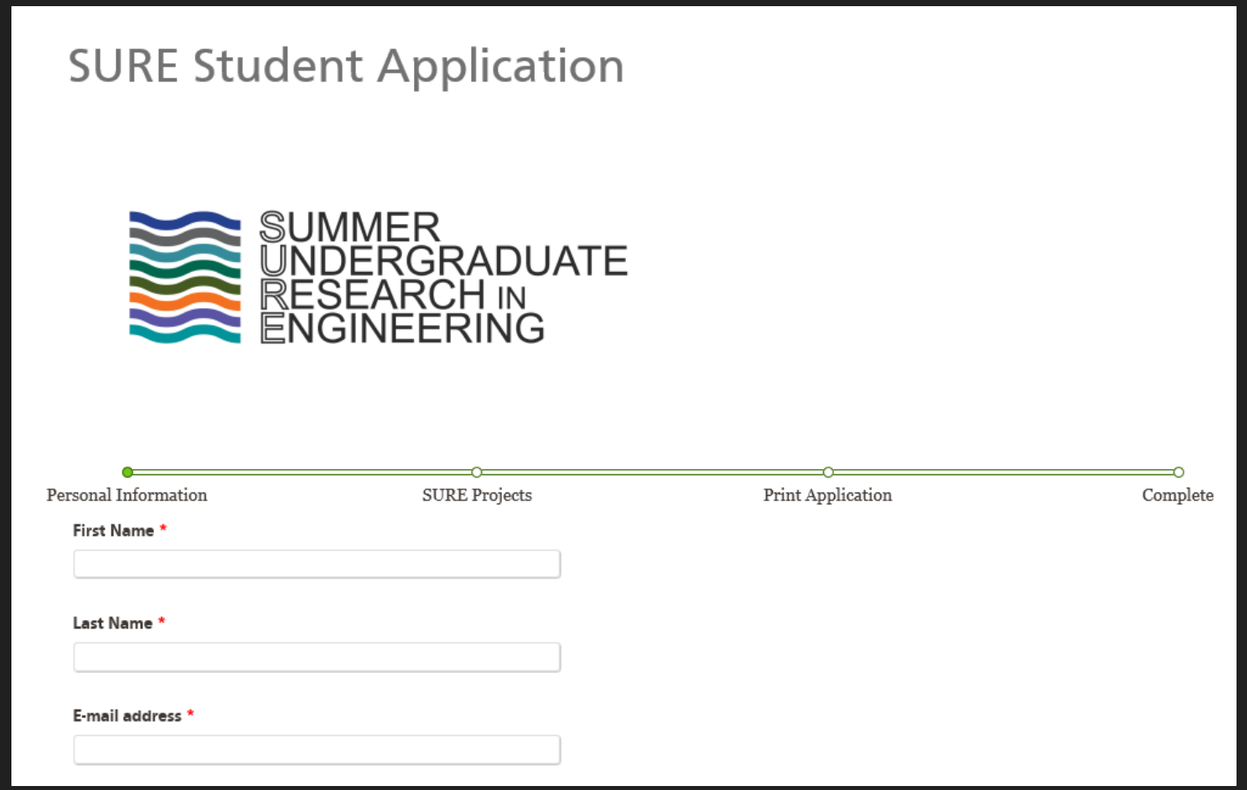
- Abstracts & Online Student Application are available at: http://www.mcgill.ca/engineering/current-students/undergraduate/research
- Contact Professor (email/ office hours) to discuss.
- After discussion with supervising professor, complete Online Application form, print and submit with Transcript of Record to your selected supervisor.
- **Definite match**: Should a professor and a student come to an agreement that they wish to work only with each other, then the student should be encouraged to apply only for one project and the professor to rank only one student.

IMPORTANT NOTES

- Maximum of **3 applications** per student
- Deadline to apply: **Friday, January 26, 2018**
  (Deadline to submit copy of online application & transcript to professor)
- Awards announced after February 19, 2018.
- **Only those selected will be contacted**
- Second round matches throughout March

ONLINE APPLICATION FORM

Application form available (under “Application”) at: http://www.mcgill.ca/engineering/current-students/undergraduate/research



NEW SINCE 2017

- SURE program will now be recorded on students' transcripts.
- Specific courses (FACC 351-354 – SURE Experience) will be added to offer students an official record of their participation in the SURE program.
- Courses cannot be added retroactively for SURE participations in previous years.

SURE EVENTS

1. Orientation – May 2nd
2. Engineering at Work Seminar – June 7th
3. Poster Design Workshop - July 5th
4. Poster Presentation Fair - August 9th

SUMMER COURSES

- SURE positions are **full-time positions** (minimum of 35 hours) for the entire 16 weeks, e.g., SURE participants should **not** be registered for any summer courses.
- Any questions about this policy should be directed to MESC sure-info.engineering@mcgill.ca

VACATION

- All SURE participants are expected to attend all SURE events.
- For those that cannot attend an event due to extenuating circumstances, please notify us at: sure-info.engineering@mcgill.ca in advance, include the reason and cc your supervisor.
- Any vacation requests have to be discussed with the supervisor in order to make arrangements to make up for the missed time.

GRADUATE STUDIES AT MCGILL

- SURE as experience to later pursue a research Masters, Ph.D.
- McGill Engineering Undergraduate Student Masters Award (MEUSMA)
  - Valued at $17,500+ for two years of research Masters study at McGill in the Faculty of Engineering
  - To qualify: CGPA 3.5+, participation in SURE or other qualifying undergraduate research experiences

More information:
graduatestudies.engineering@mcgill.ca

SURE

INTERNATIONAL

International SURE Travel Stipend, funded in part by

- The Antje Graupe Pryor Foundation (for research in Europe)
- McGill International Experience Awards (MIEA) (for research outside of Canada)
- Enhanced Educational Opportunities (EEO) (Merit-based funding awarded by MESC; need-based funding determined by the Scholarships and Student Aid Office)
- Limited number of stipends are available to students who are accepted to an international research project at another university. Award amounts vary.

Application form available March 1st - March 31st:
http://www.mcgill.ca/engineering/current-students/undergraduate/research/sure-international

QUESTIONS?

Email

SURE-Info.Engineering@mcgill.ca

In Person

Engineering Student Centre, FDA 22