



April 03, 2024

Neighborhood-City Scales Urban Physics Modeling and Measurements

Opportunity: Fully Funded Ph.D. Position

Start Date: Fall 2024 or Winter 2025

Program: Mechanical/Civil/Environmental Engineering, University of Guelph

Application Deadline: Search Continues Until Position is Filled

Overall Project:

Understanding and mitigating the growing environmental impact of cities requires design and prediction tools, such as Urban Physics Models (UPMs). UPMs predict urban climate variables (outdoor air temperature, wind, precipitation, humidity, evaporation, flooding, and heat transfer fluxes) and building performance variables (energy loads and indoor thermal comfort indices). The overall project attempts to 1) develop, improve, and utilize paradigm-shifting and computationally fast atmospheric transport models for neighborhood-city scales and 2) collect urban climate and building performance observation data at neighborhood-city scales.

Ph.D. Position Activities:

The Ph.D. applicant will primarily develop, validate, and calibrate UPMs at neighborhood-city scales. Capabilities of a pre-existing UPM, the Vertical City Weather Generator (VCWG), will be extended for neighborhood-city scales analysis. Modeling paradigms considered include but can extend beyond Computational Fluid Dynamics (CFD), multi-zone thermal network simulations, meso-scale Numerical Weather Prediction (NWP) using Weather Research and Forecasting (WRF) software, and Lagrangian/Eulerian atmospheric advection-diffusion simulations. The Ph.D. applicant may also contribute to urban physics measurements using satellite image analysis, anemometry (wind), thermometry (temperature), radiometry (shortwave and longwave radiation fluxes), and humidity/water observations. The measurements will be used to validate and calibrate the UPMs. The Ph.D. applicant will participate in knowledge dissemination activities such as attending conferences, seminars, workshops, publishing journal articles, distributing open-source software, and more.

Desired Skills:

The most desired skills involve experimental/numerical competency in environmental thermo-fluids, mathematics, physics, statistics, and ability to do programming and analyze large datasets.

Amir A. Aliabadi, Ph.D., P.Eng.

Associate Professor

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Historically, applicants with core engineering or science degrees, especially related to thermo-fluids, have fitted in the Atmospheric Innovations Research (AIR) lab programs very well. Experimental skills in anemometry, thermometry, imaging, data-logging, and signal processing are advantageous. Knowledge in Python, C, C++, and/or Fortran programming is an asset. Scientific documentation (papers, theses, and presentations) in the AIR lab should be prepared using LaTeX.

Equity, Diversity, and Inclusion (EDI):

Applicants will be recruited considering EDI best practices to ensure a transparent, open, and standard process that is fair to all. The AIR lab promotes the inclusion of gender, racial, visible, indigenous, and other minority trainees. Equity-seeking groups are encouraged to apply.

About University of Guelph:

The University of Guelph, situated on treaty lands and territory of the Mississaugas of the Credit of the Anishinaabek Peoples, is the third largest employer in Guelph, a city of approximately 130,000 people, located about an hour drive west of Toronto, Ontario. University of Guelph is a top-ranked comprehensive university in Canada with an enrolment of more than 30,000 undergraduate and graduate students across over 40 academic units. University of Guelph is a unique place, with transformative research and teaching and a distinctive campus culture. People who learn and work here are shaped and inspired by a shared purpose: To Improve Life.

Application Process:

For further information, applicants can contact Dr. Amir A. Aliabadi at aliabadi@uoguelph.ca. Please provide your 1) CV, 2) research statement, 3) unofficial transcripts, 4) sample publications, and 5) contact list of 3 references. Potential applicants will be invited to participate in an interview process. To be considered, they also need to simultaneously apply to the University of Guelph following this link: <https://www.uoguelph.ca/engineering/grad/application-process>. Details about the AIR lab are available via www.aaa-scientists.com.

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