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**SHORT ABSTRACT**

***Abstract title:*** Can Physics Informed Deep Learning be used to predict Urban Wind Field ?

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## Abstract text *(maximum 350 words.)*

A swift and accurate reconstruction of the urban wind field and weather conditions is a prerequisite for air quality management, the efficient crisis response to accidental release of toxic species, as well as urban drone trafficking. Any pollutant dispersion model requires some knowledge of the real-time 3D wind field over the urban district of interest. However, the canonical approach for wind field simulation relies on time-consuming computational fluid dynamics simulations such as at the very least the non-linear Reynolds Averaged Navier Stokes equation.

We propose discussing and showing first results of a surrogate model for the wind field over a test urban district. We start from a finite set of CFD simulations performed with Code\_SATURNE, constrained by a given meteorologic external inlet wind direction and amplitude. Given that accurate CFD calculations are computationally expensive, we only carry out a limited number of parametric simulations to provide a training dataset; the input parameters in each case are the wind velocity components at the boundary of the simulation domain. A neural network regression from these computed solutions has been developed to einfer the wind velocity field all over the urban district for any choice of the external wind parameters. The Physics Informed Deep Learning model learns from the simulation data, the proper boundary conditions on the canopy, ground and obstacles, as well as the continuity and momentum conservation equations. The surrogate model obtained through regression can reconstruct the wind field very fast; however, it needs to be validated under real field measurements in any meteorological conditions.

## Motivation\*

We aim to discuss with the conference community the potential of artificial neural networks to provide a swift and reliable urban wind map that can be used for dispersion studies. Physics informed deep learning using simulation data can be a powerful tool for this purpose.