

## Pollutants transport and diffusion: a sensitivity analysis.

Prediction of dispersion and transport of pollutants is an important issue in the everyday life of a large number of industries. A systematic way of predicting the impact of different sources (chimneys, outlet tubes, ...) can be made by a sensitivity analysis. Posing the problem in an input-output framework, the sensitivity can mathematically be written as the functional gradient of the output (a measure of the pollutants) with respect to the input (source distribution, shape of chimney, outlet tube velocity, ...). The project work is numerical and the main goal is to write a code for 2D flow describing the evolution of transport and diffusion of pollutants in time. Further, it consists of deriving and implementing the corresponding adjoint equation which is used to efficiently compute the sensitivity.

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Figure 1: Dispersion of particles emanating from (left) a chimney and (right) a volcanic eruption. We can predict (measure) where most particles end up. How can we, in the best way, change the shape of the chimney outlet such that most particles end up in a predefined place ?