Title

Subtitle

Author

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Outline

Objective

Initial Research Question

Lagrangian Particle Tracking of Snowflakes

Find a general formula for the drag coefficient of blowing snow

$$c_D = c_D(Re, \text{parameters})$$

And implement it in PoliMIce with some general rule for the choice of the main parameters.

Literature Review

What is not available

- c_D formula tuned for snowflakes
- Experimental measurements of blowing snowflakes velocities
- Shape of the typical snowflake (they are almost unique)

What is available

- c_D formulae tuned for arbitrary shaped bodies
- Experimental measurements of falling snowflakes terminal velocities
- General parameters that describe the shape (CAMBIARE)

Updated Research Question

Drag coefficient formula

Find a suitable existing model to infer the main parameters in the falling regime and use them in the blowing one

Snow Parameters

Develop a method to find the discrete set of properties that on average describe a certain *cloud*

Outline

Data Generation

Reproduce an artificial data set from the *velocity-diameter* relation of Brandes et al - 2008. The diameter distribution is not taken into account.

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Figure not found

The Drag Model

Ganser - 1993

$$c_D = K_2 \left(\frac{24}{ReK_1K_2}(1 + 0.1118(ReK_1K_2)^{0.6567}) + \frac{0.4305}{1 + \frac{3305}{ReK_1K_2}} \right)$$

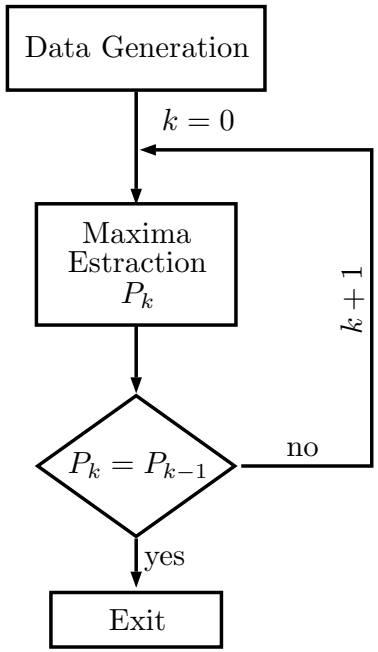
Stokes' Shape Factor

$$K_1 = \left(\frac{1}{3}\frac{d_n}{d_v} + \frac{2}{3}\Phi^{-\frac{1}{2}} \right)^{-1}$$

Newton's Shape Factor

$$K_2 = 10^{1.8148(-log(\Phi))^{0.5743}}$$

General Scheme



Bayesian Approach

Gaussian Mixture Models