

# The Aerodynamics of a Falling Maple Seed

Task for a project or thesis

## Background

The maple seed (*Acer pseudoplatanus*) enters an autorotation after it is released from its stem, connecting it to the maple tree. During autorotation, the governing aerodynamics allow the seed to slow down its vertical velocity to a certain extent, rendering it more susceptible to effective wind dispersal. This evolutionarily shaped mechanism has pushed the aerodynamics of the winged seed towards very high efficiencies, constantly being put to the test in its race of survival. Subsequently, an understanding of these aerodynamical principles resulting in such high efficiencies would be truly valuable.

## Task

Determine how much longer the seed falls using autorotational principles when compared to freefall. Examine this in constructing an aerodynamical framework following these steps:

- Start with a review to show what exists (or rather does not exist) on the topic.
- Calculate the lift generated by a maple seed and discuss the important derived equations.
- Use Blade Element Momentum Theory to calculate the equilibrium falling speed in air.
- Define a model that allows the calculation of a ratio declaring how much longer the seed falls in air.
- Validate the constructed method using calculation examples.
- Discuss your results and make recommendations.

The report has to be written in English based on German or international standards on report writing