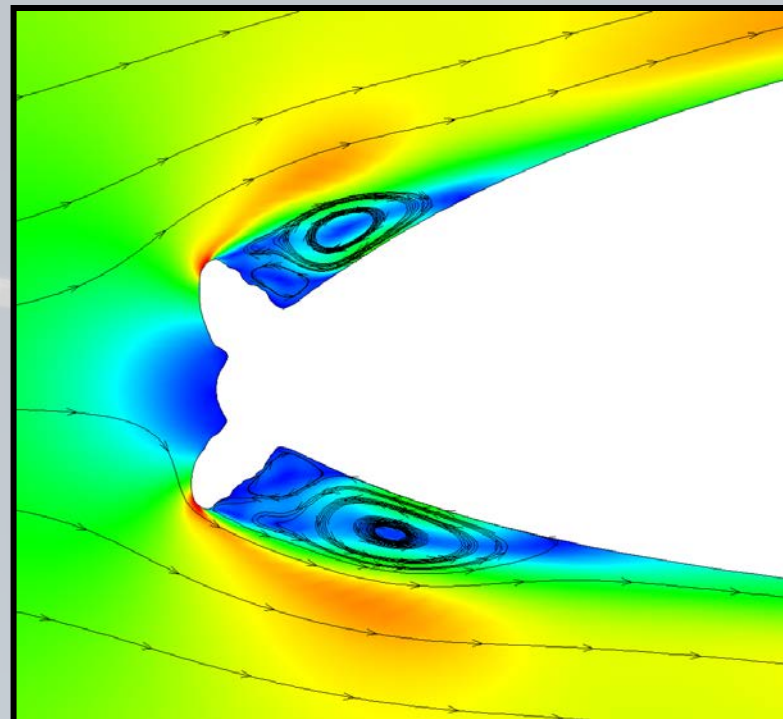# Simulation and Validation of the Aerodynamic Performance of Iced Wind Turbine Airfoils

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Introduction

Ice accumulates on the leading-edge of the airfoil and may cause severe flow separation.

Simulation

Numerical methods are used to:
- Predict ice shapes
- Estimate performance losses
- Assess additional loads
- Design anti- & de-icing systems
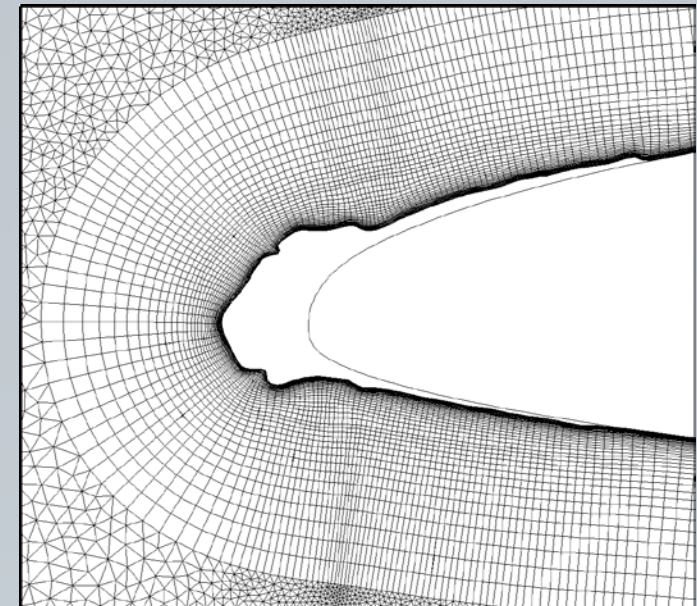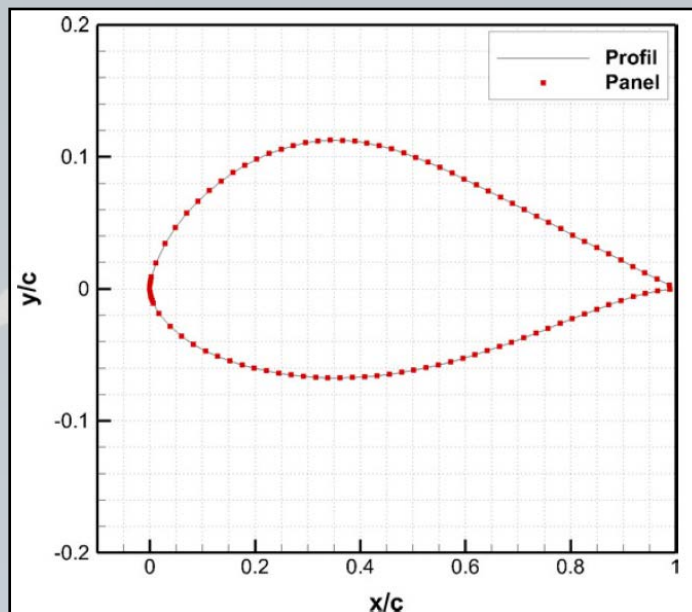
Numeric Methods

Panel method
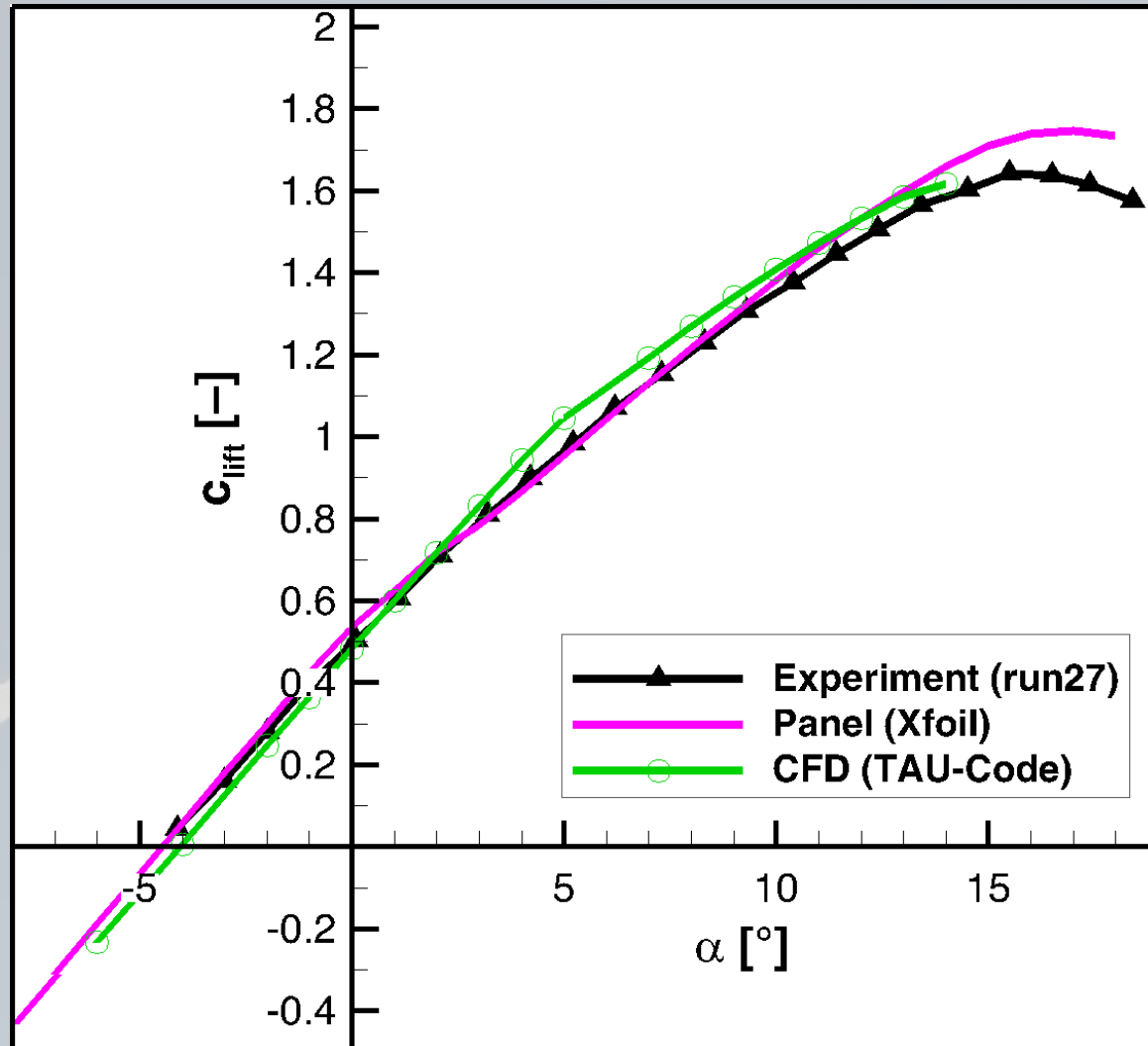- Fast & efficient
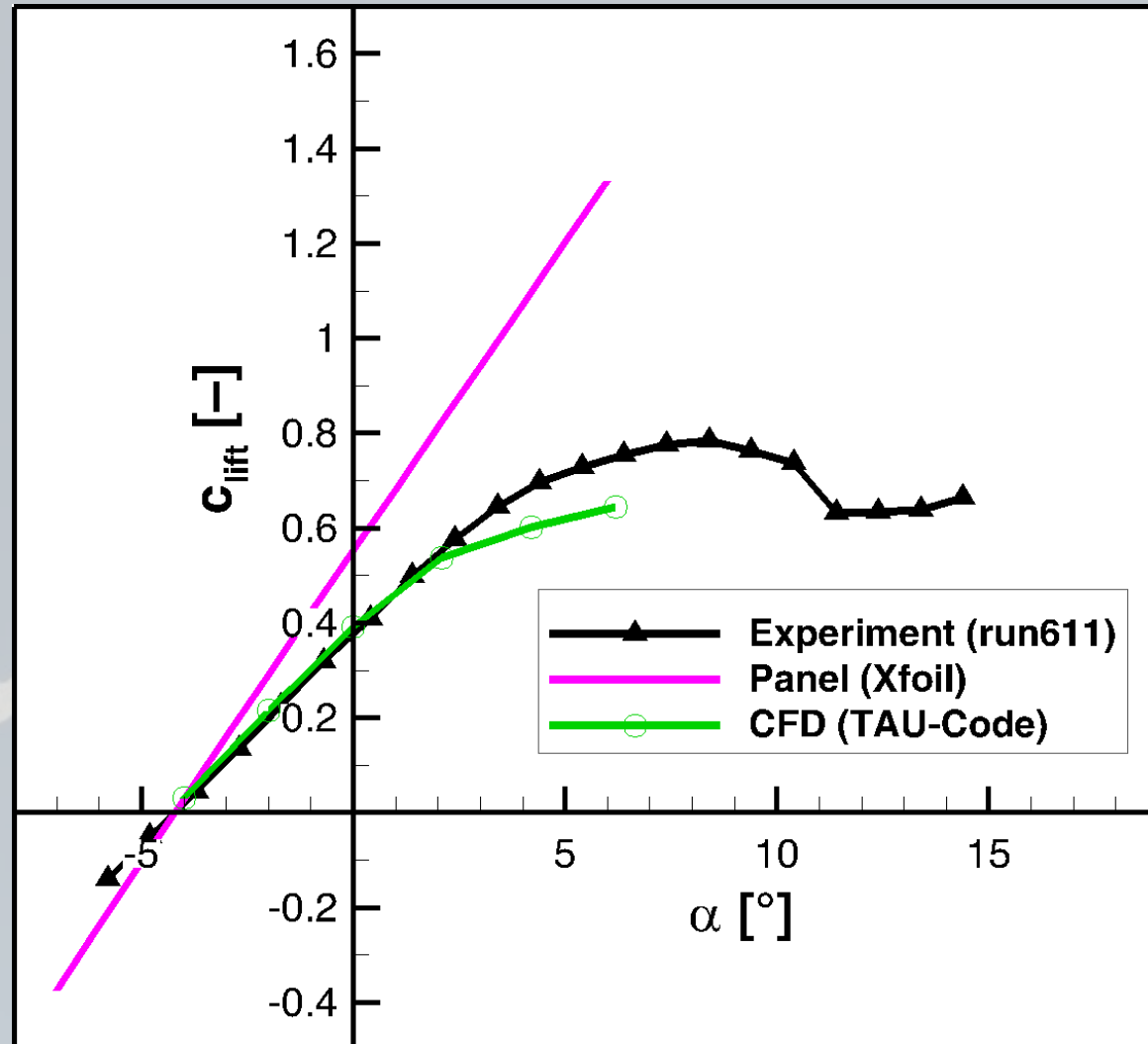- Simple geometries
- e.g. Xfoil

VS

CFD
- Slow & expensive
- Complex geometries
- e.g. TAU-Code (DLR)

Simulation Clean Airfoil

Simulation Iced Airfoil

Summary

➢ Panel methods are widely used for icing simulation
➢ In the iced state panel methods fail to capture the airflow correctly
➢ Higher order RANS-solvers are needed for more realistic results
➢ However this comes at higher computational costs and higher complexity

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- H.E. Jr. Addy: *Ice Accretions and Icing Effects for Modern Airfoils*. National Aeronautics and Space Admistraton (NASA), 2000.