Design and application of an experimental hydrofoil testrig

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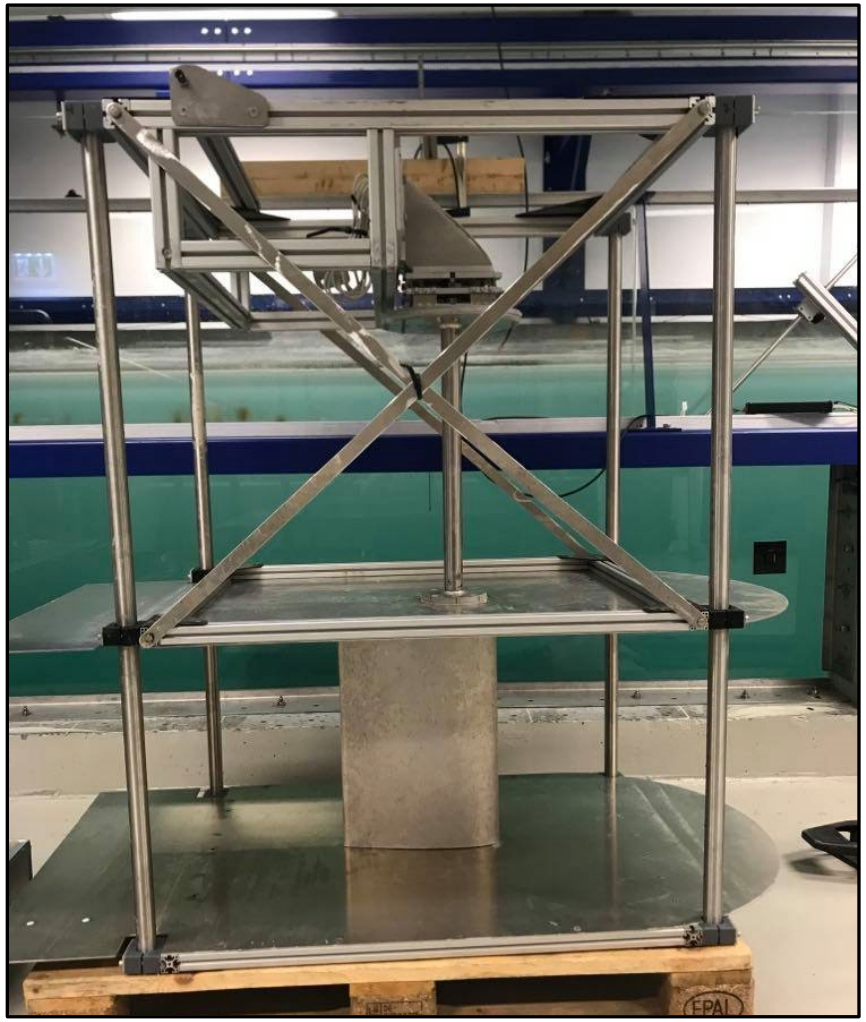
Objective and methodology

- Experiments at MarinLab, HVL Bergen
  - NACA0018
  - $6 \cdot 10^4 \leq Re \leq 2 \cdot 10^5$
  - $-9^o \leq$ angle of attack $\leq 20^o$
  - Endplates applied
- Numerical analyses with OpenFOAM
  - Reynolds-Averaged Navier-Stokes equations (RANS)
  - Spalart-Allmaras turbulence model



Side view of testrig with NACA0018 airfoil

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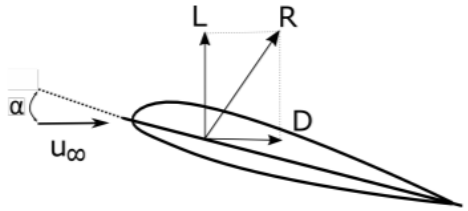
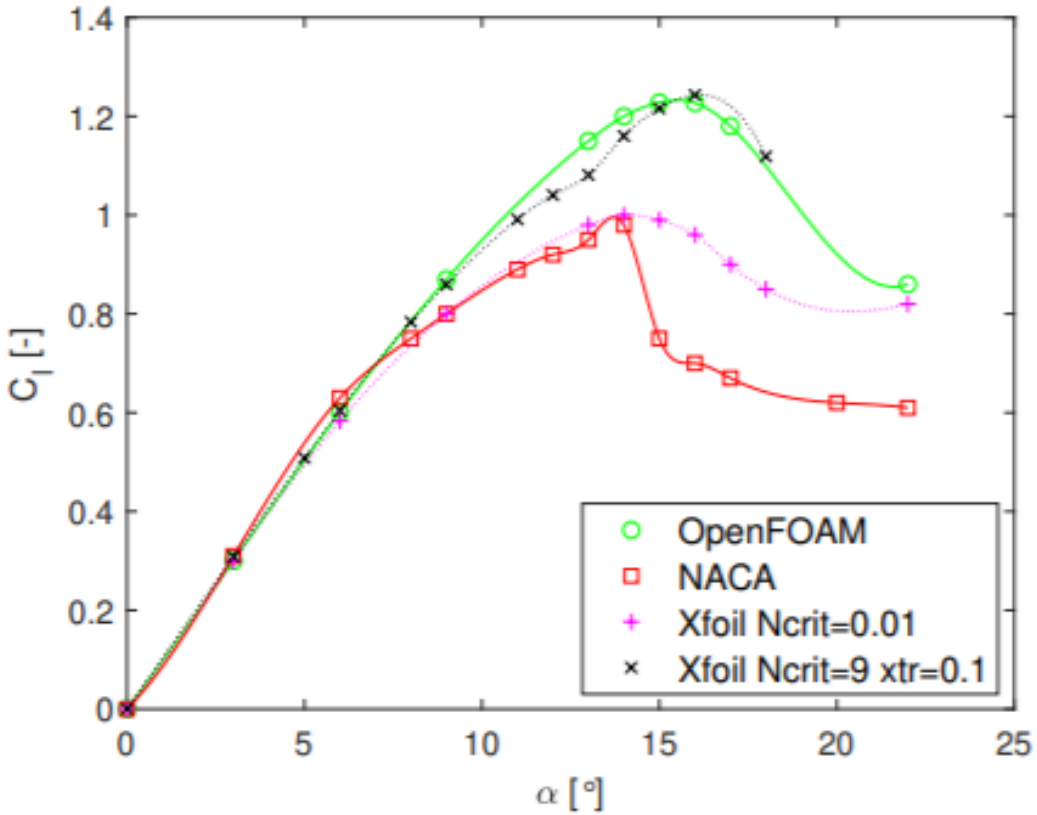
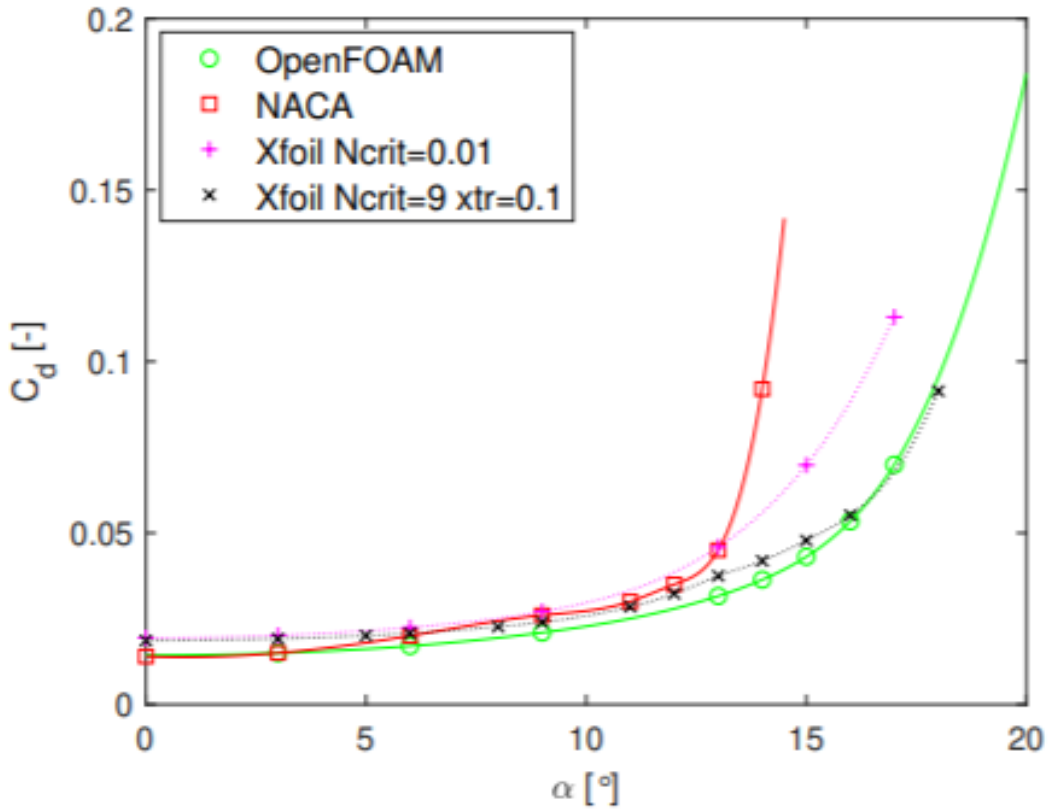
Numerical results





Lift coefficient vs. Angle of attack for Re = 1,63·10^5



Drag coefficient vs. Angle of attack for Re = 1,63·10^5

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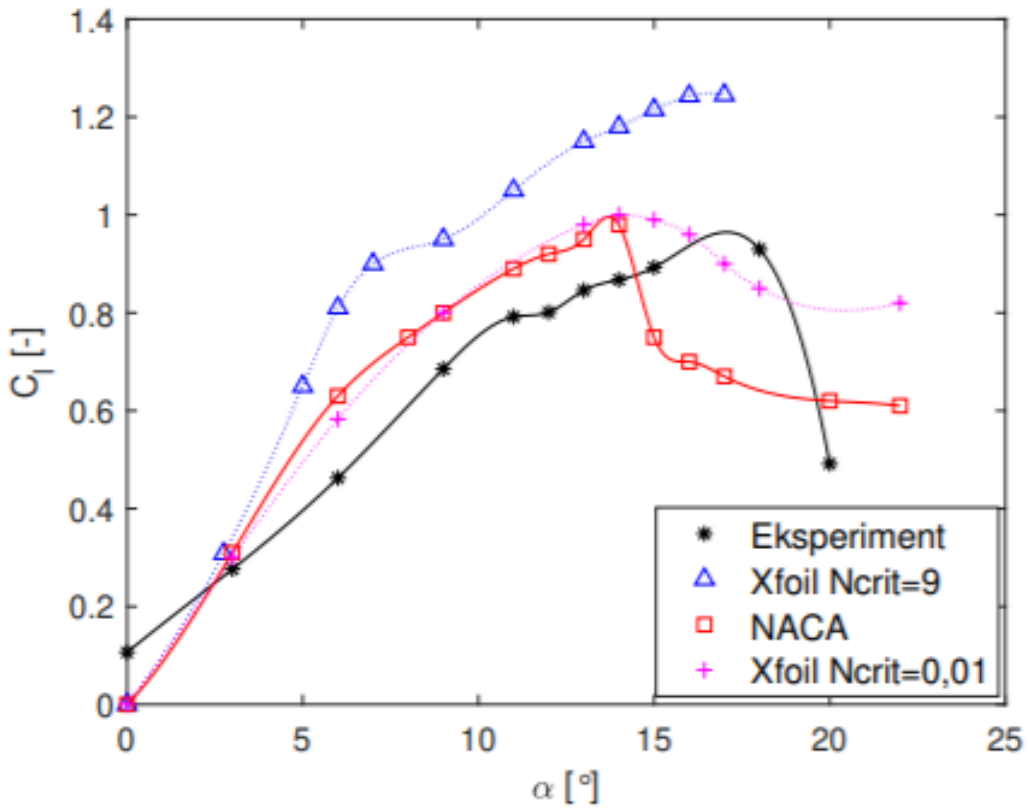
Experimental results



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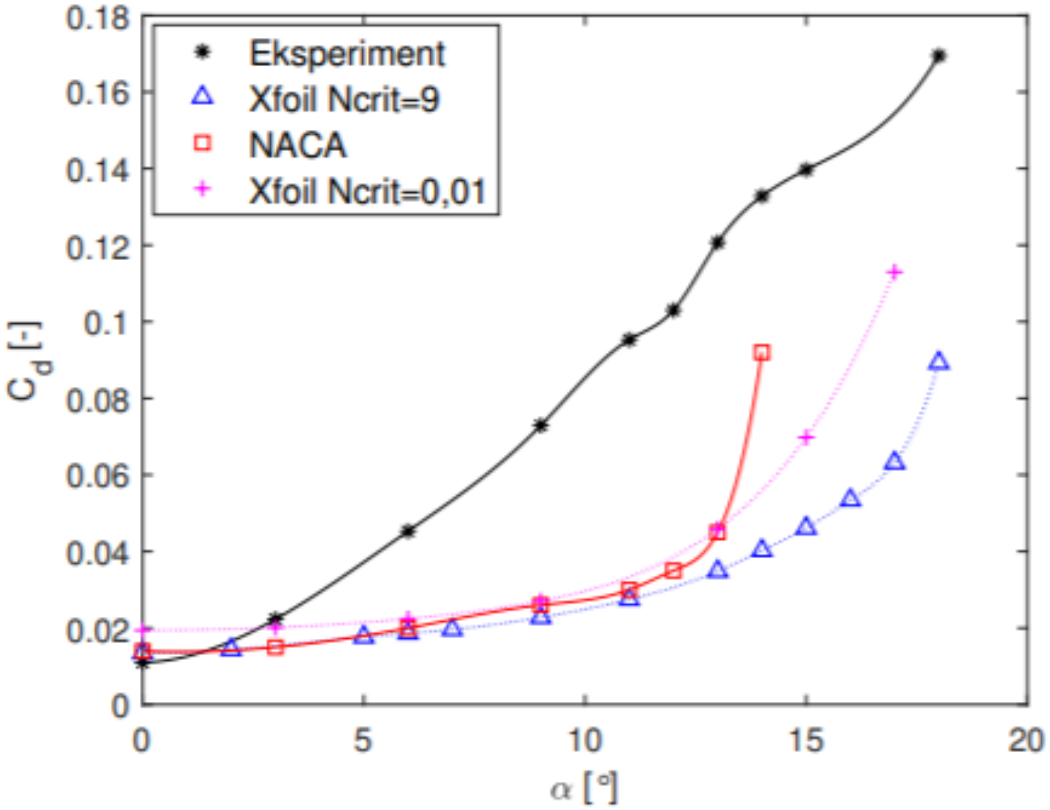

Drag coefficient vs. Angle of attack for Re = 1,63·10^5

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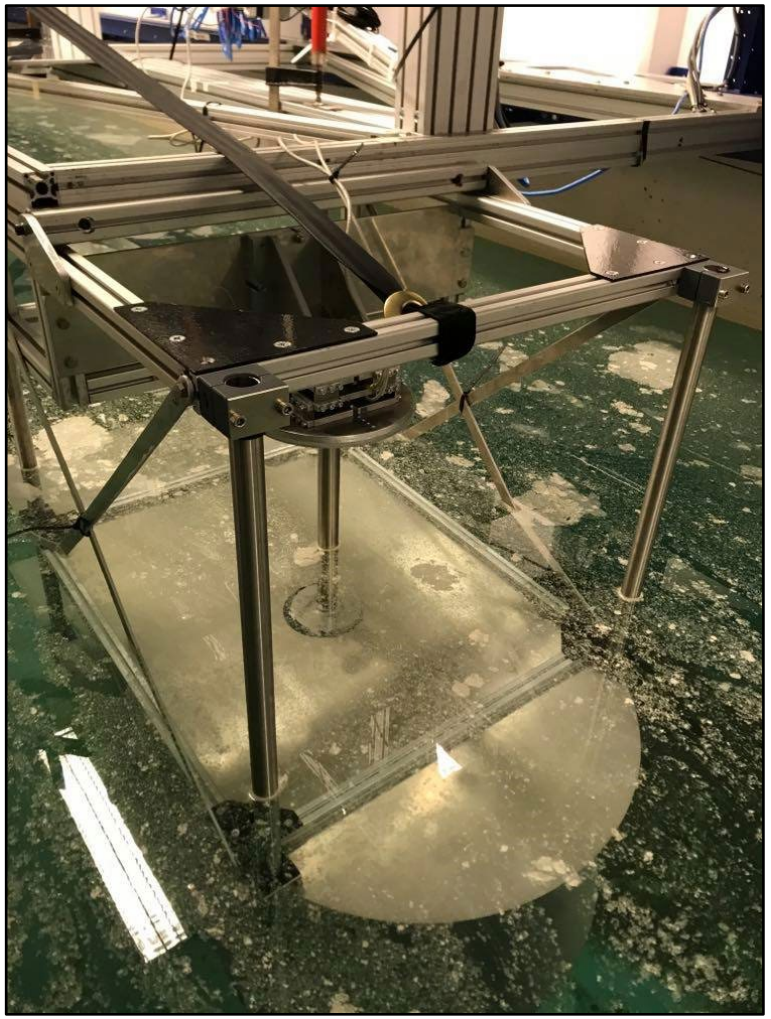
Conclusions

- Good agreement within numerical study
- Better turbulence modeling in OpenFOAM
- Experiments indicate higher turbulence and possible 3D-flow effects
- Further development and testing needed



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