RSF Project 20-41-09018_ANR
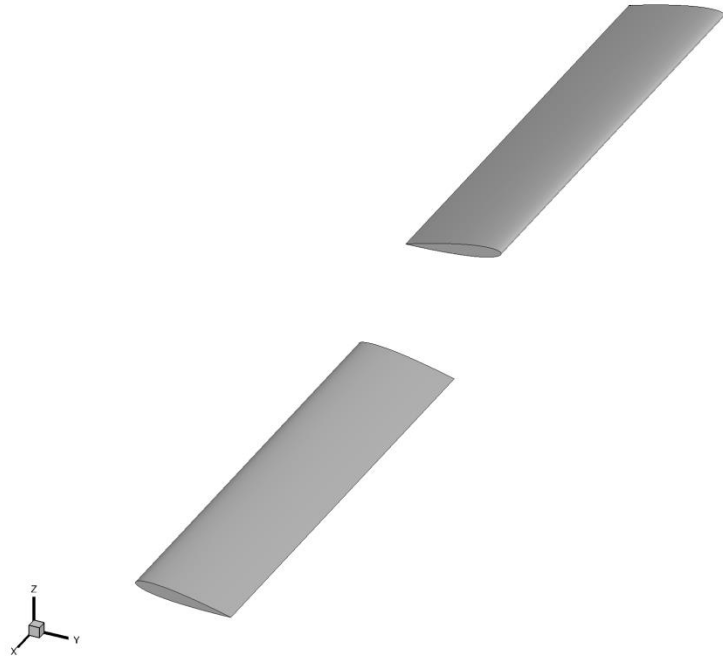
NORMA
NOise of **R**otating **Ma**chines

Single rotor: RANS vs. DDES

Vladimir Bobkov

Case setup

|	
Blades count N	2
Rotor radius R	1.143 m
Blade chord b	0.1905 m
Blade airfoil	NACA 0012
Pitch angle	8°
Rotational speed	650 RPM
Blade tip velocity V_{tip}	77.8 m/s
Reynolds number	9.8×10^5

Caradonna, F.X. and Tung, C. Experimental and Analytical Studies of a Model Helicopter Rotor in Hover. Technical report, NASA Technical Memorandum TM-81232, 1981
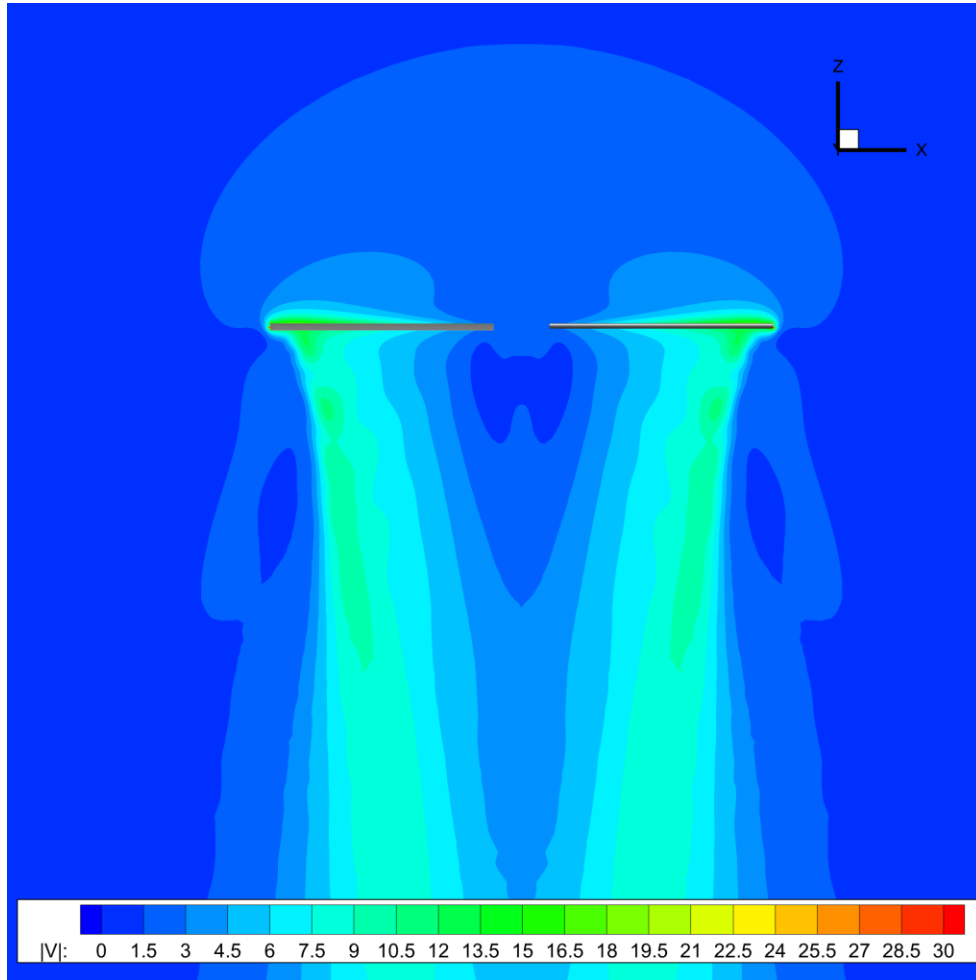
Computational meshes
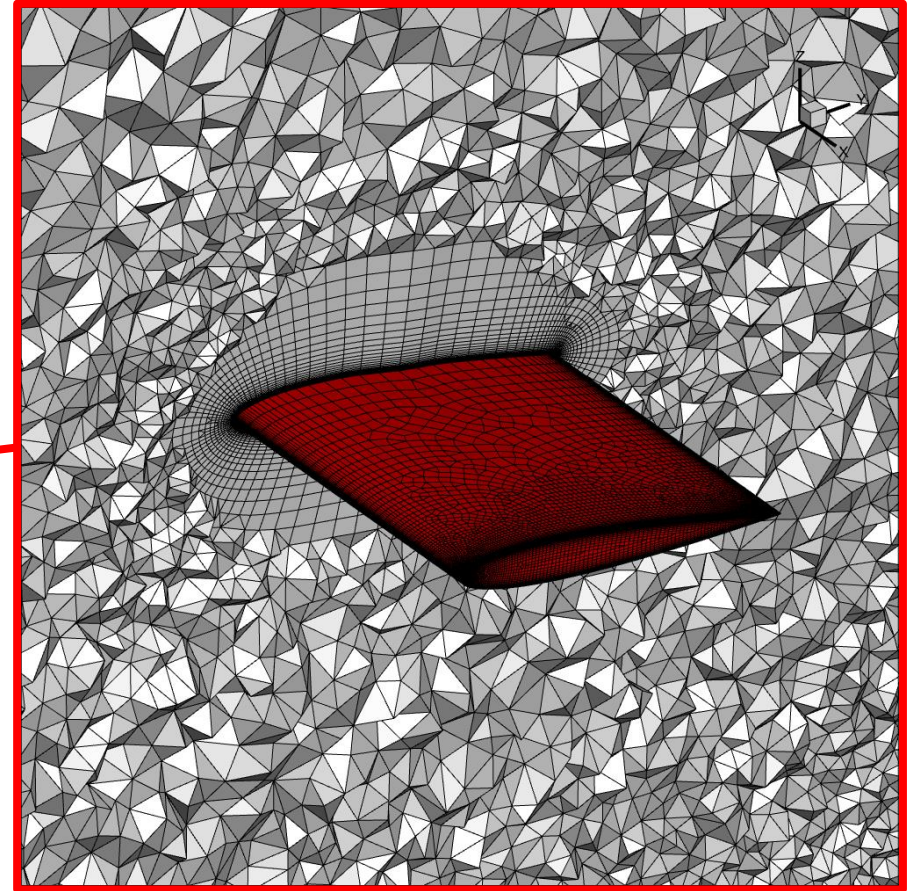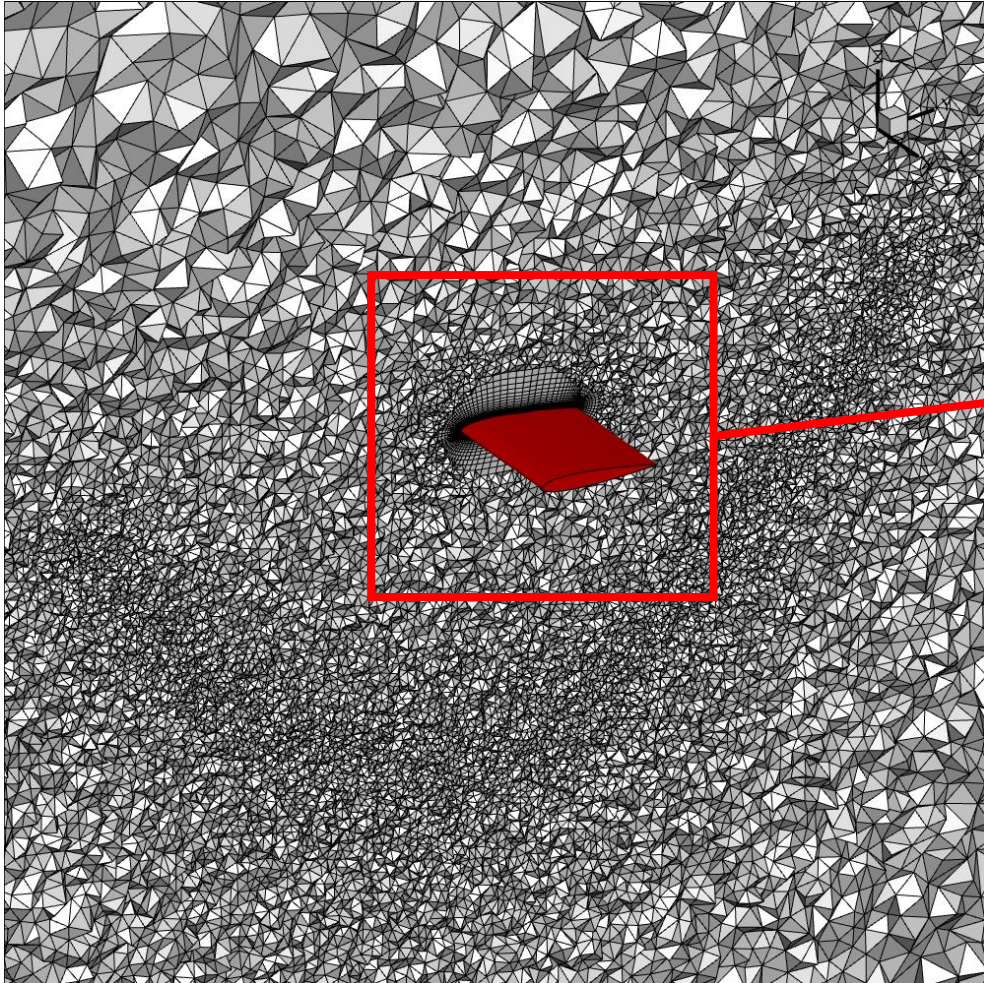
Mesh for RANS-based simulation:
mixed-element unstructured mesh
2.6(5.2)M nodes, 10(20)M elements
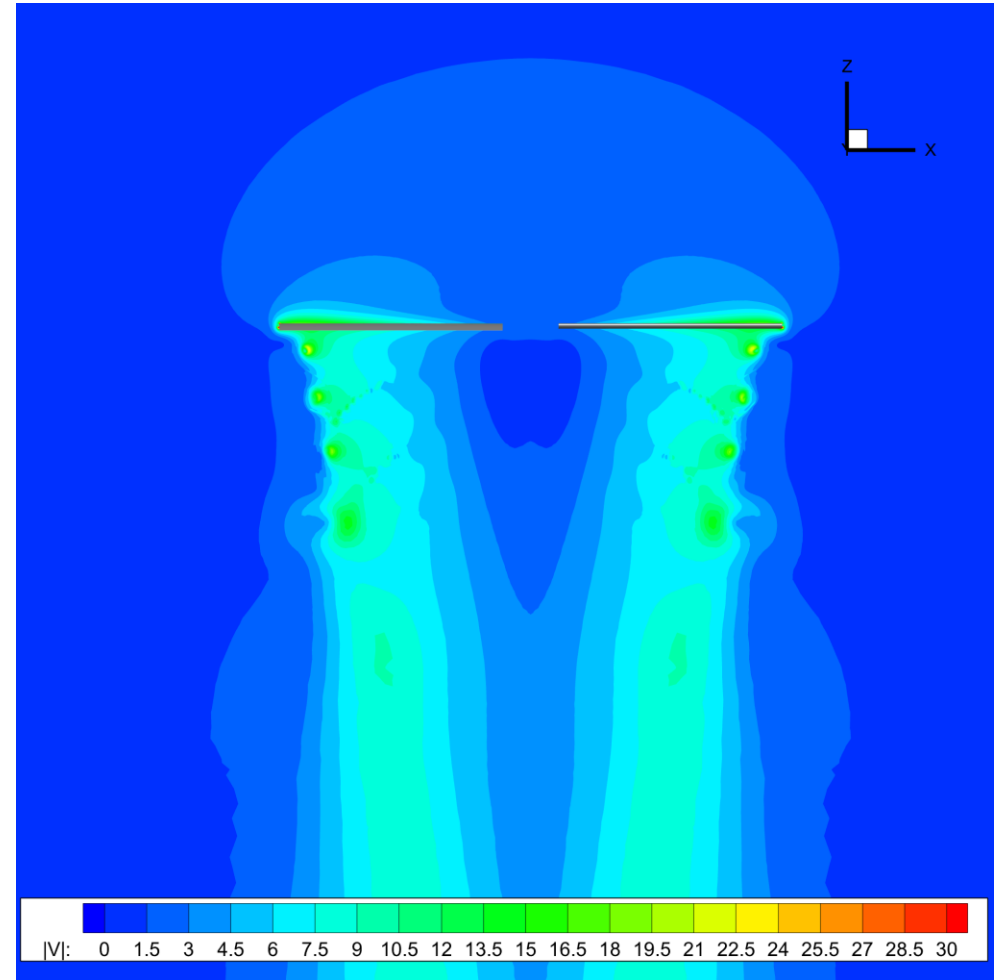
Computational meshes
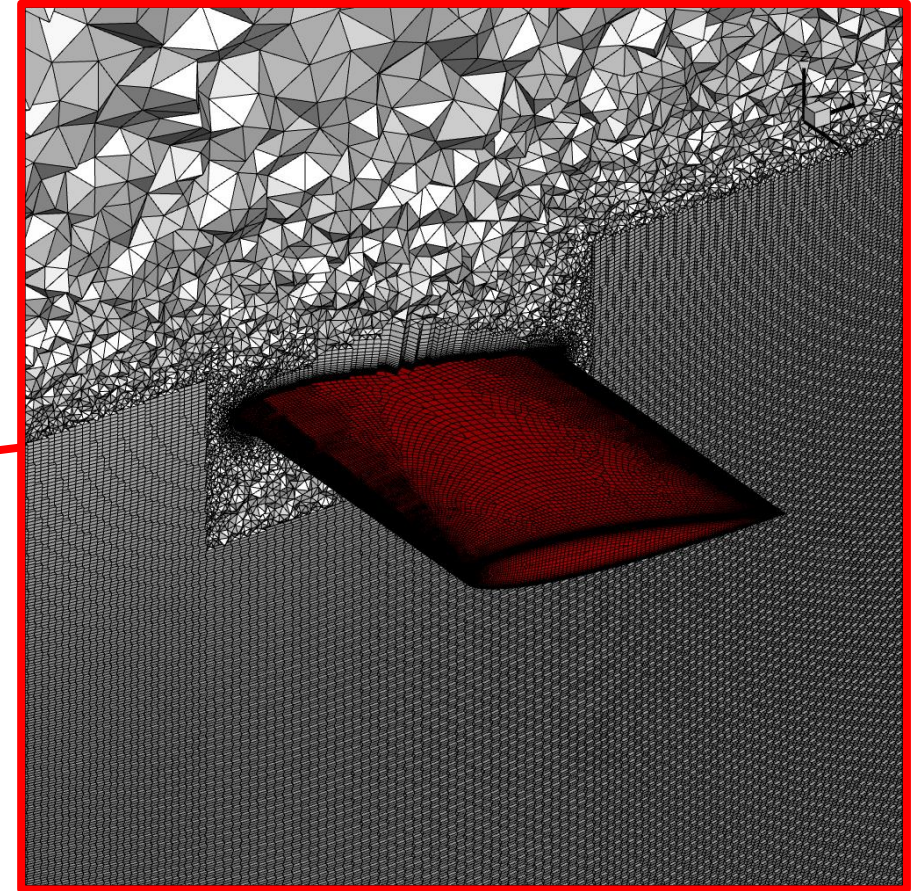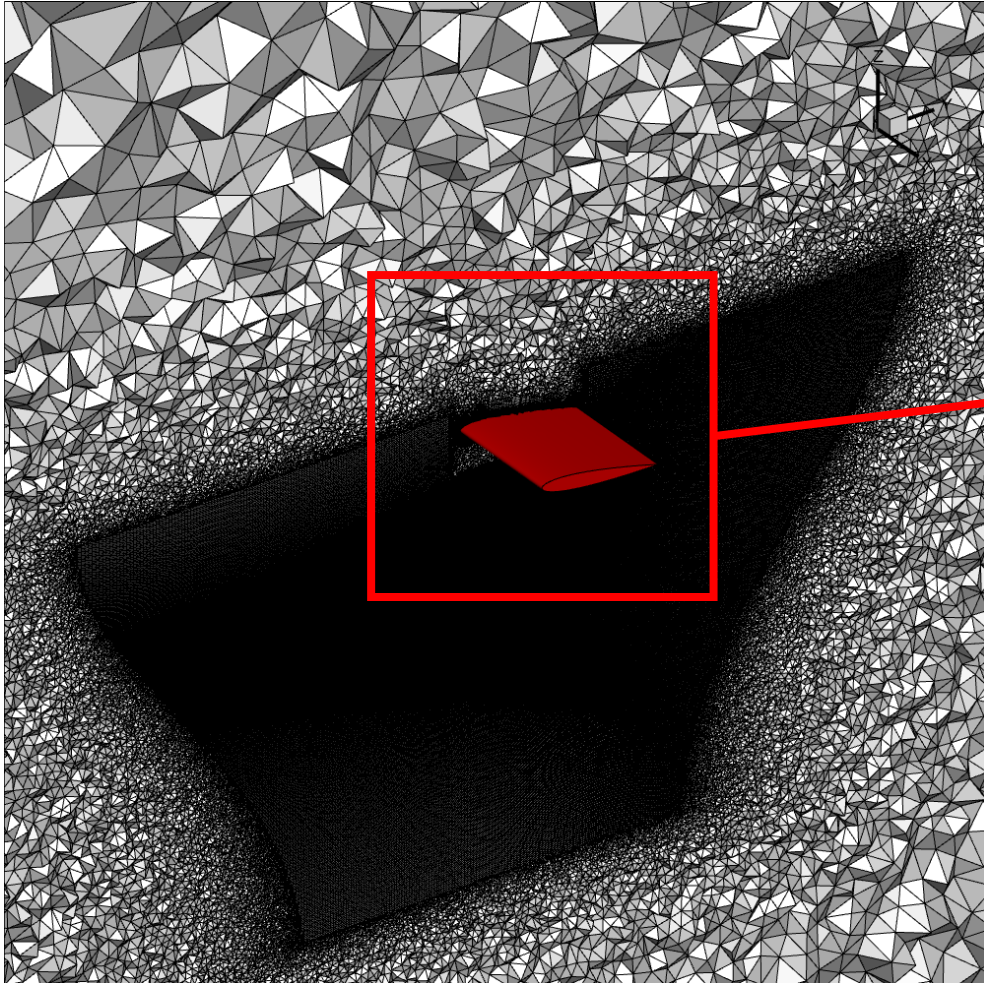
Mesh for DDES-based simulation:
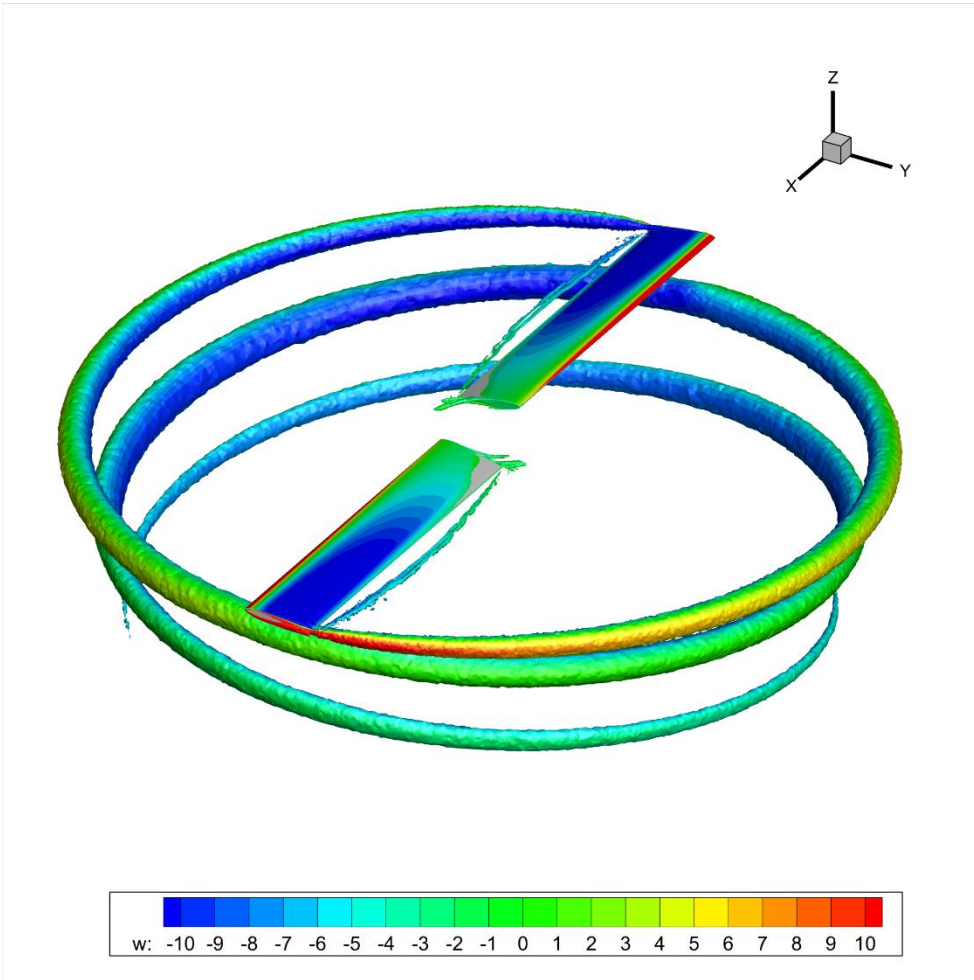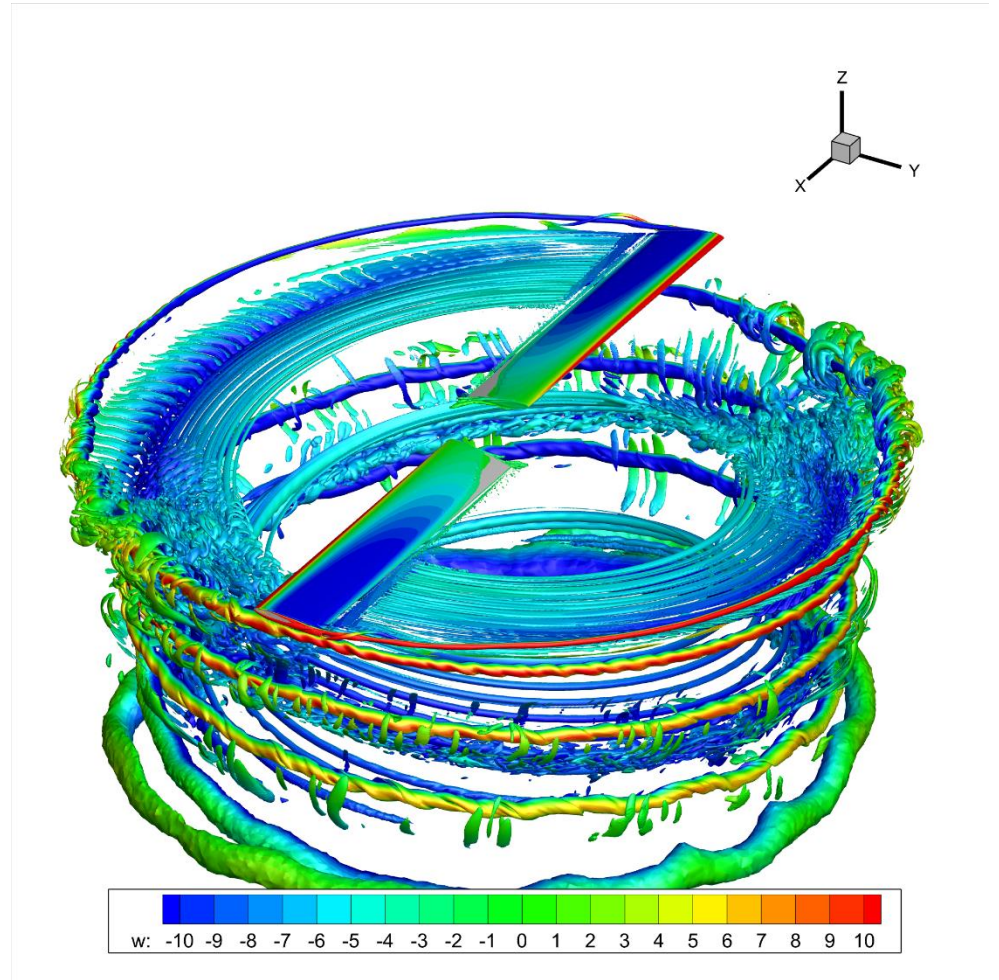mixed-element unstructured mesh
156M nodes, 244M elements

Flow field

RANS

DDES

Flow field

RANS

DDES

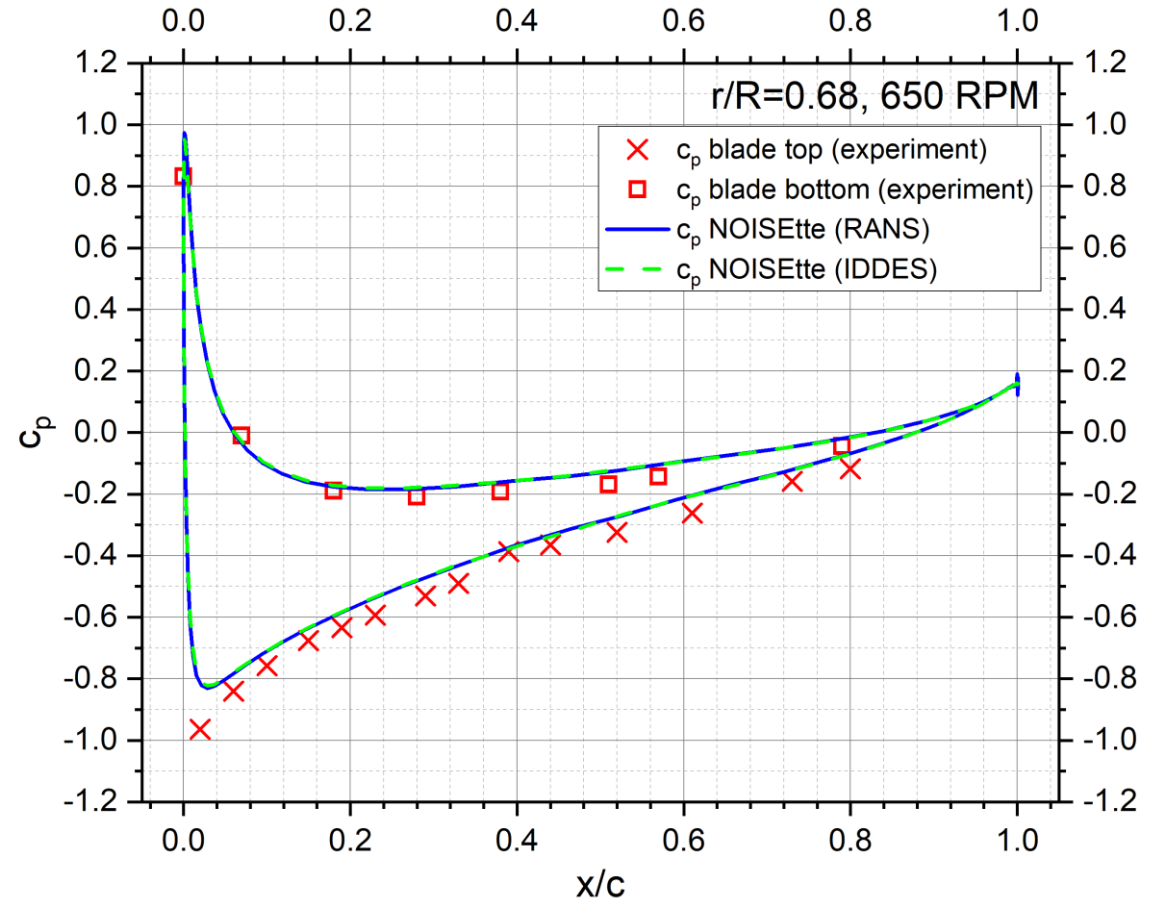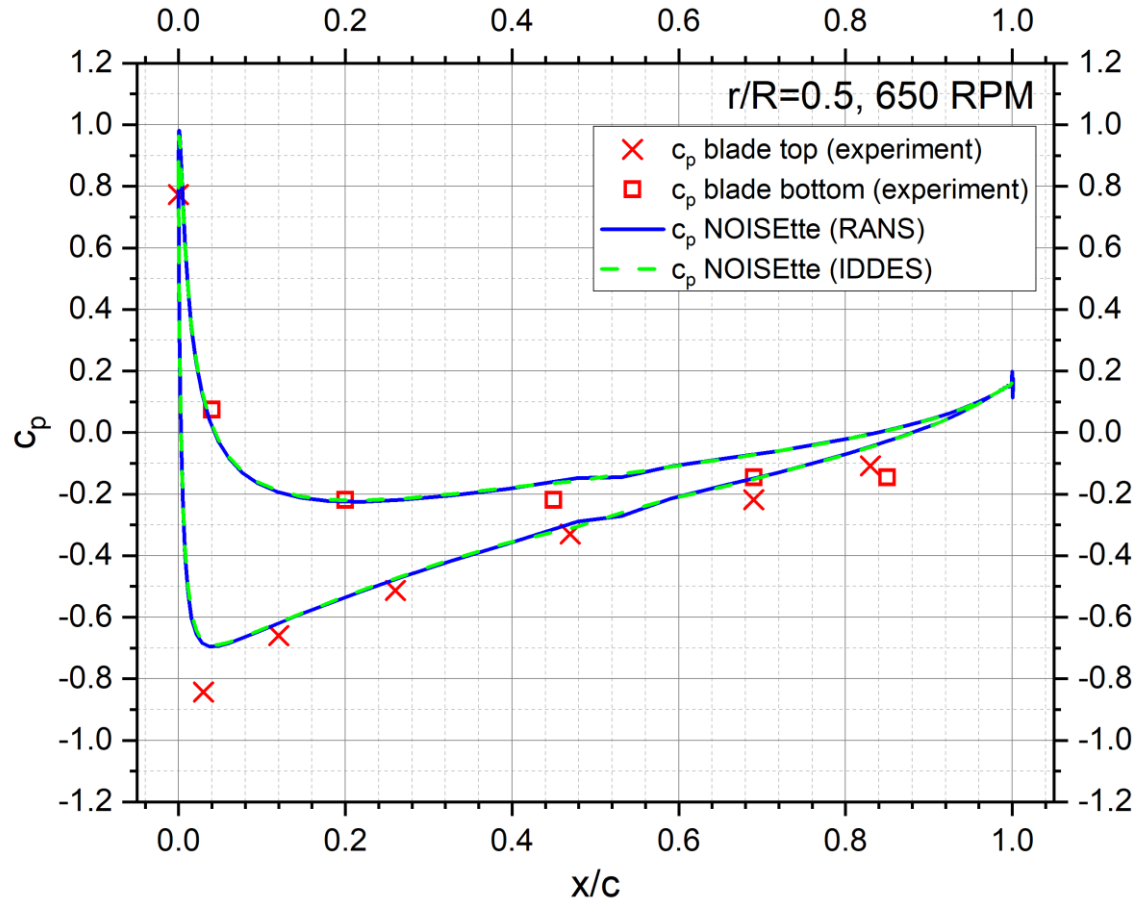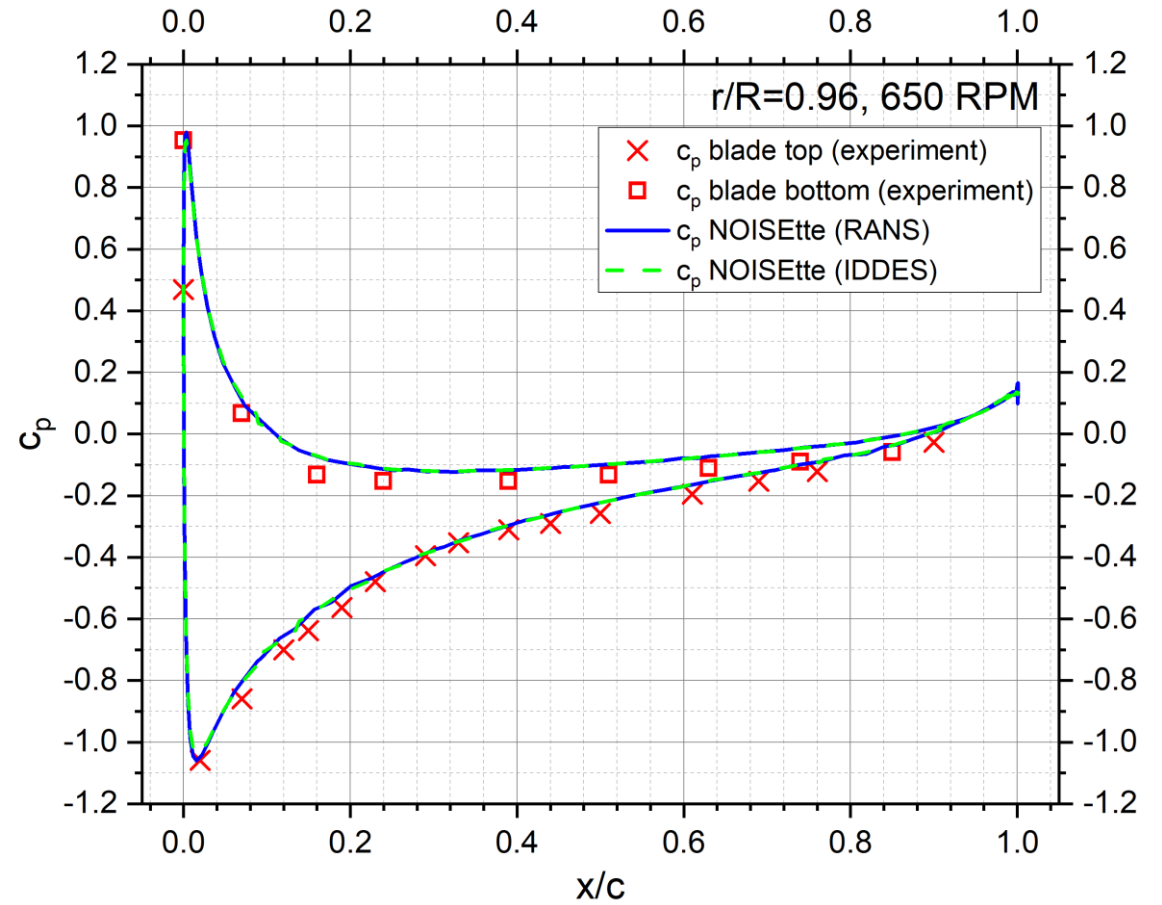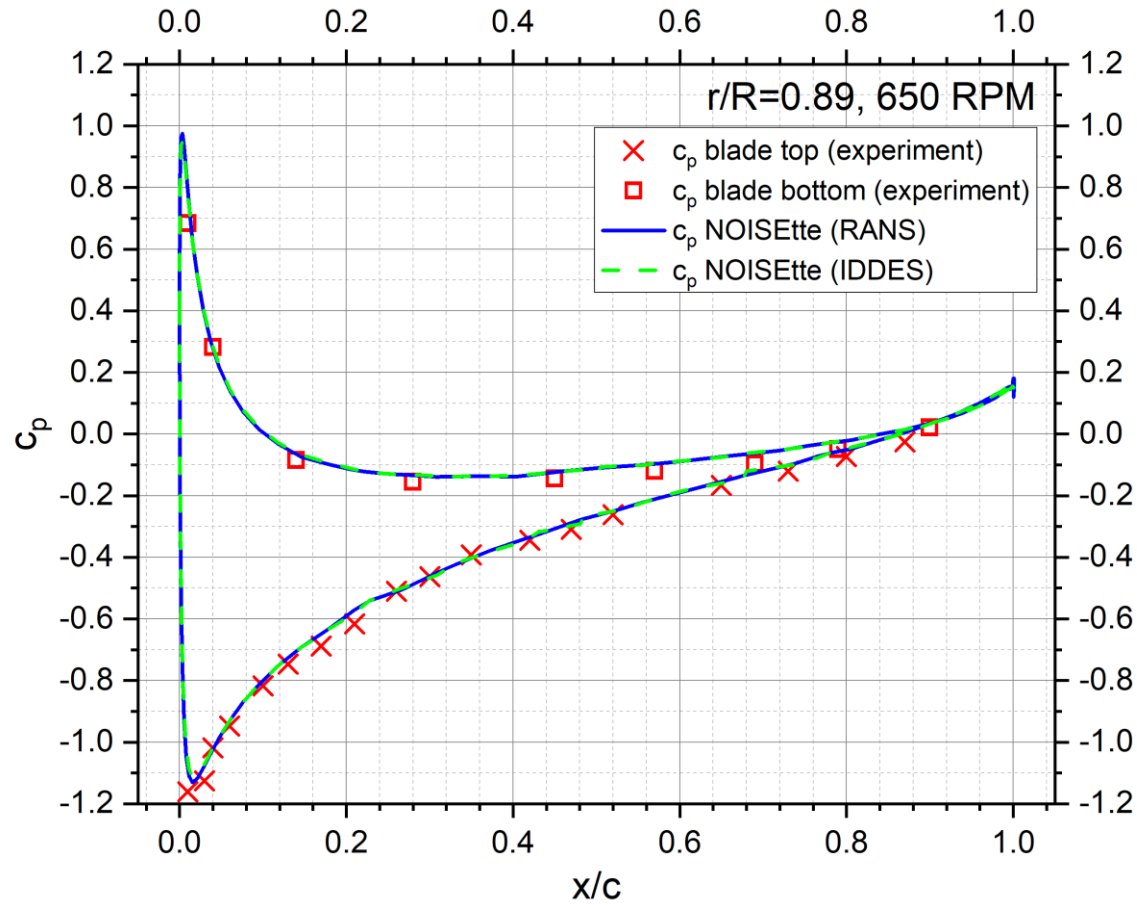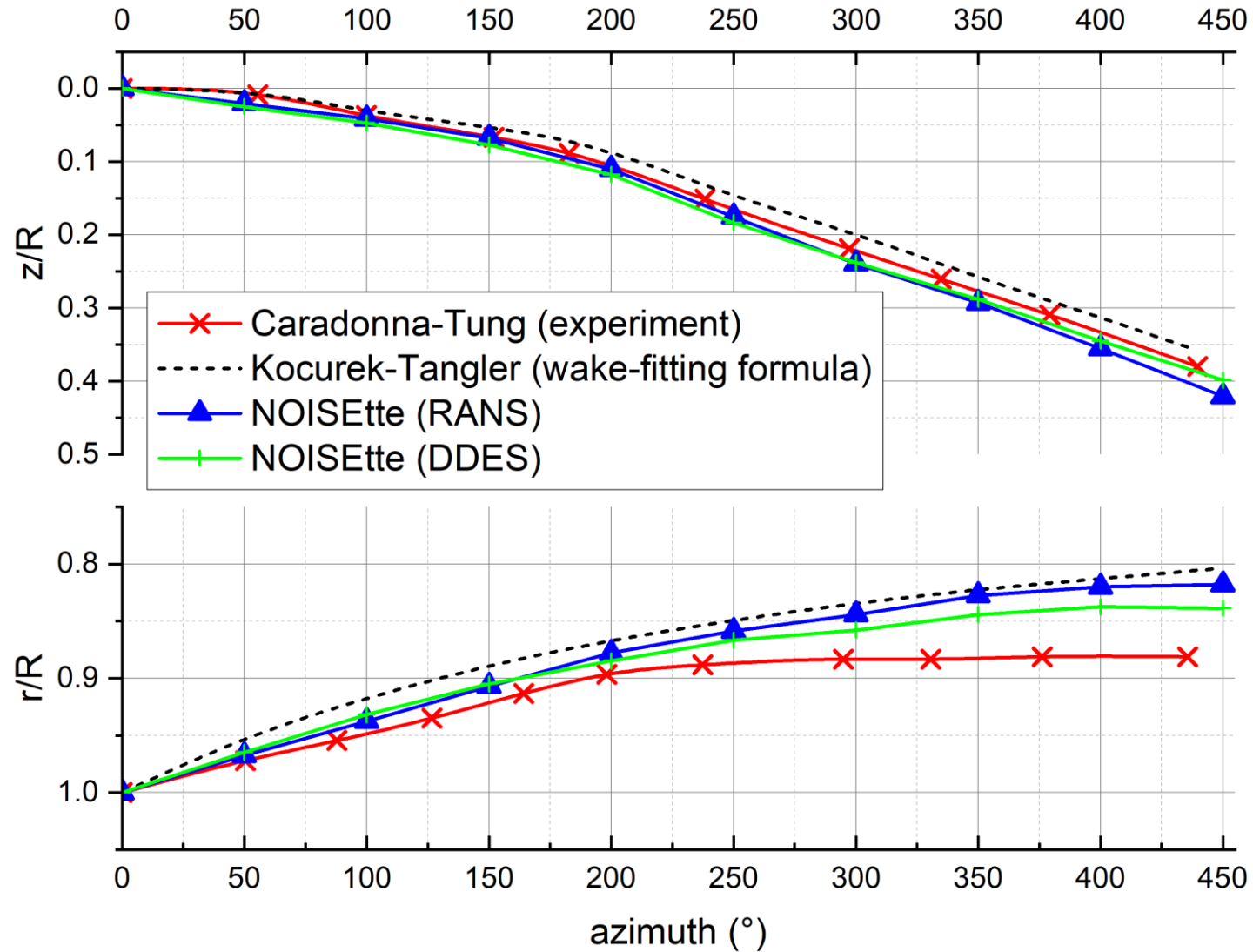# Pressure coefficient distribution

Pressure coefficient distribution

Tip vortex evolution

Current status

- RANS vs. DDES aerodynamics – **done**
- RANS vs. DDES acoustics – **in process**

Thank you!