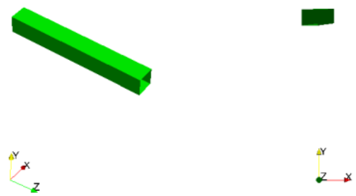
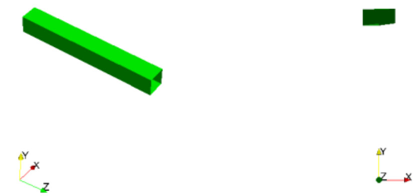
Vortex shedding past square cylinder

Vortex shedding past square cylinder



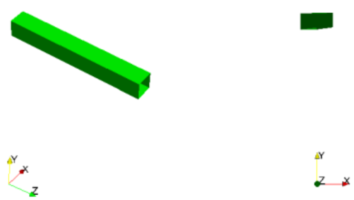
URANS (K-Omega SST with no wall functions) – Vortices visualized by Q-criterion

www.wolfdynamics.com/wiki/squarecil/urans2.gif



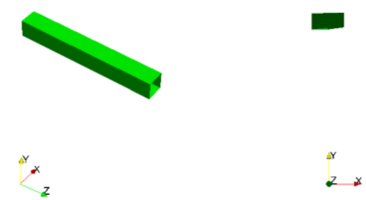
LES (Smagorinsky) – Vortices visualized by Q-criterion

www.wolfdynamics.com/wiki/squarecil/les.gif



Laminar (no turbulence model) – Vortices visualized by Q-criterion

www.wolfdynamics.com/wiki/squarecil/laminar.gif



DES (SpalartAllmarasDDES) – Vortices visualized by Q-criterion

www.wolfdynamics.com/wiki/squarecil/des.gif

Vortex shedding past square cylinder

Turbulence model	Drag coefficient	Strouhal number	Computing time (s)
Laminar	2.81	0.179	93489
LES	2.32	0.124	77465
DES	2.08	0.124	70754
SAS	2.40	0.164	57690
URANS (WF)	2.31	0.130	67830
URANS (No WF)	2.28	0.135	64492
RANS	2.20	-	28246 (10000 iter)
Experimental values	2.05-2.25	0.132	-

Note: all simulations were run using 4 cores.

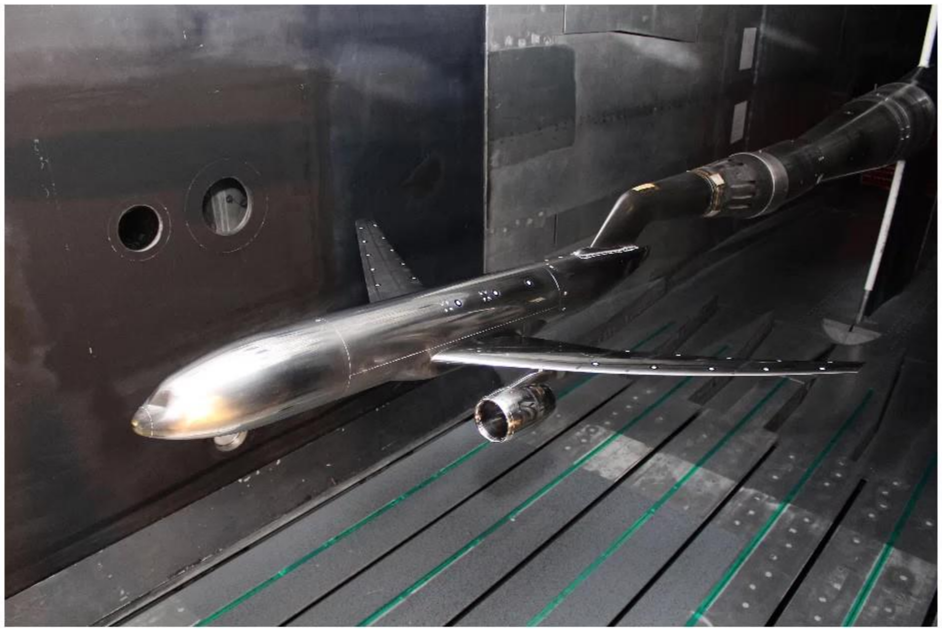
References:

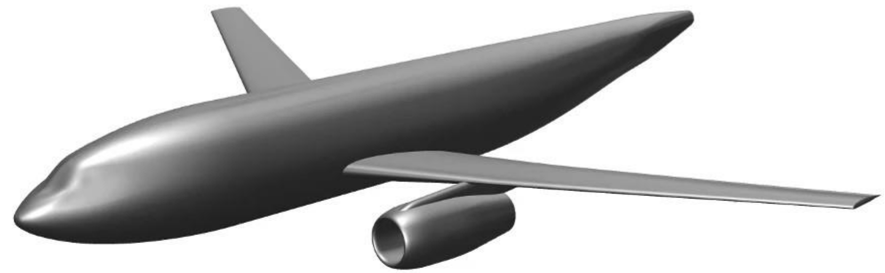
D. A. Lyn and W. Rodi. "The flapping shear layer formed by flow separation from the forward corner of a square cylinder". *J. Fluid Mech., 267, 353, 1994.*

D. A. Lyn, S. Einav, W. Rodi and J. H. Park. "A laser-Doppler velocimetry study of ensemble-averaged characteristics of the turbulent near wake of a square cylinder". *Report. SFB 210 /E/100.*

DLR-F6 aircraft model – RANS simulation

DLR-F6 aircraft model – RANS simulation



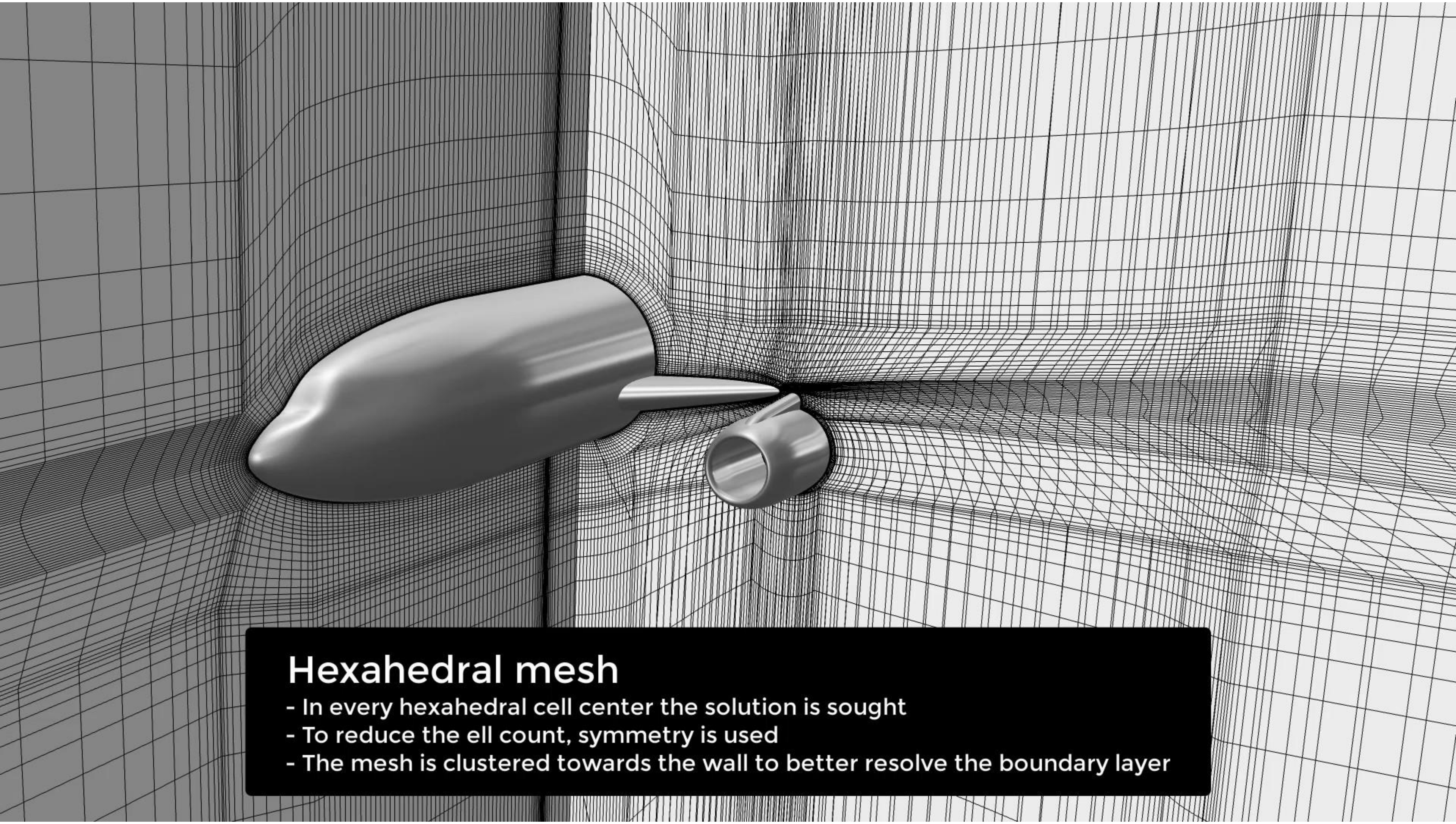


DLR-F6 aircraft model - CFD validation test case

- Mach number = 0.75
- Angle-of-attack = 0 degrees

https://youtu.be/DY6QfKk3N-A

DLR-F6 aircraft model – RANS simulation



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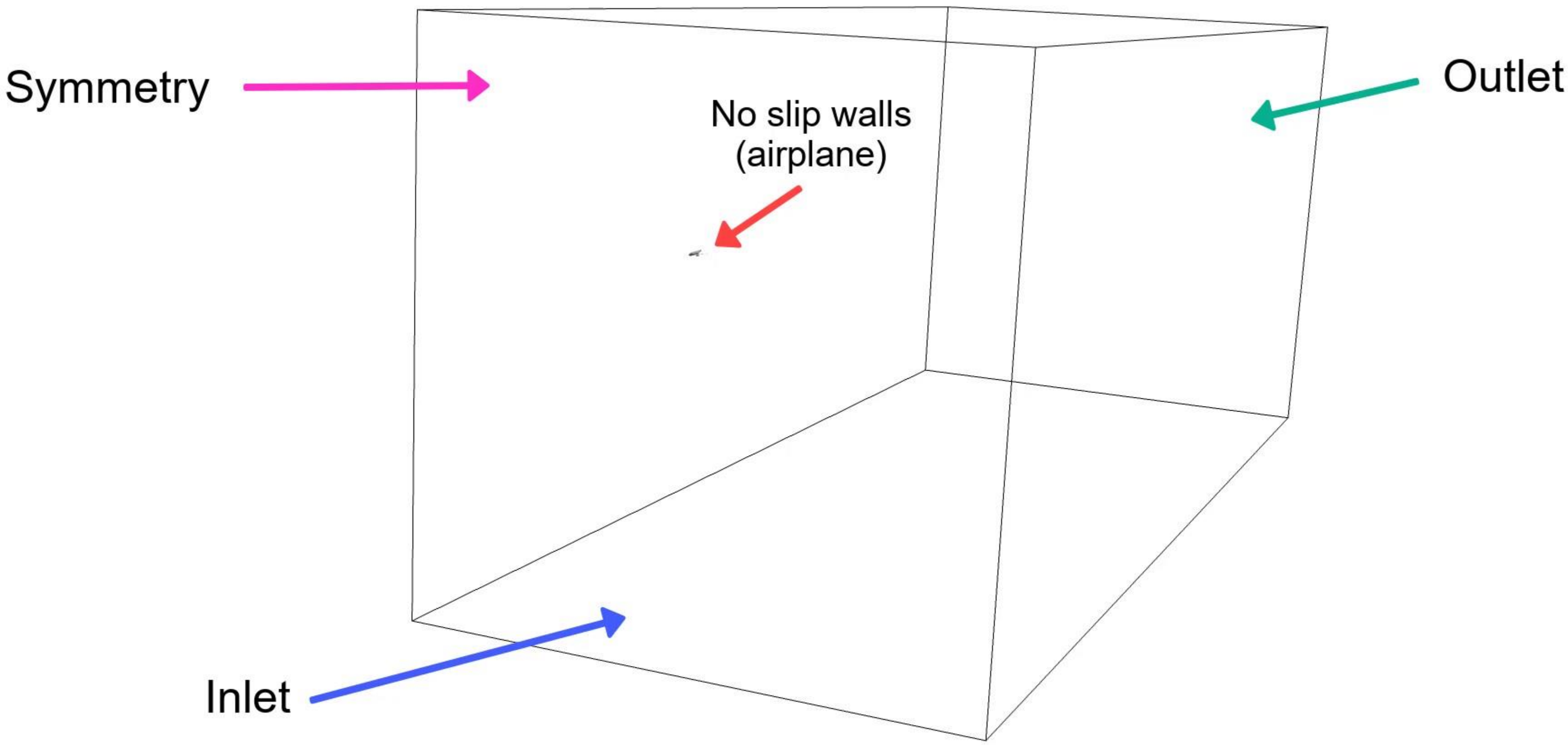
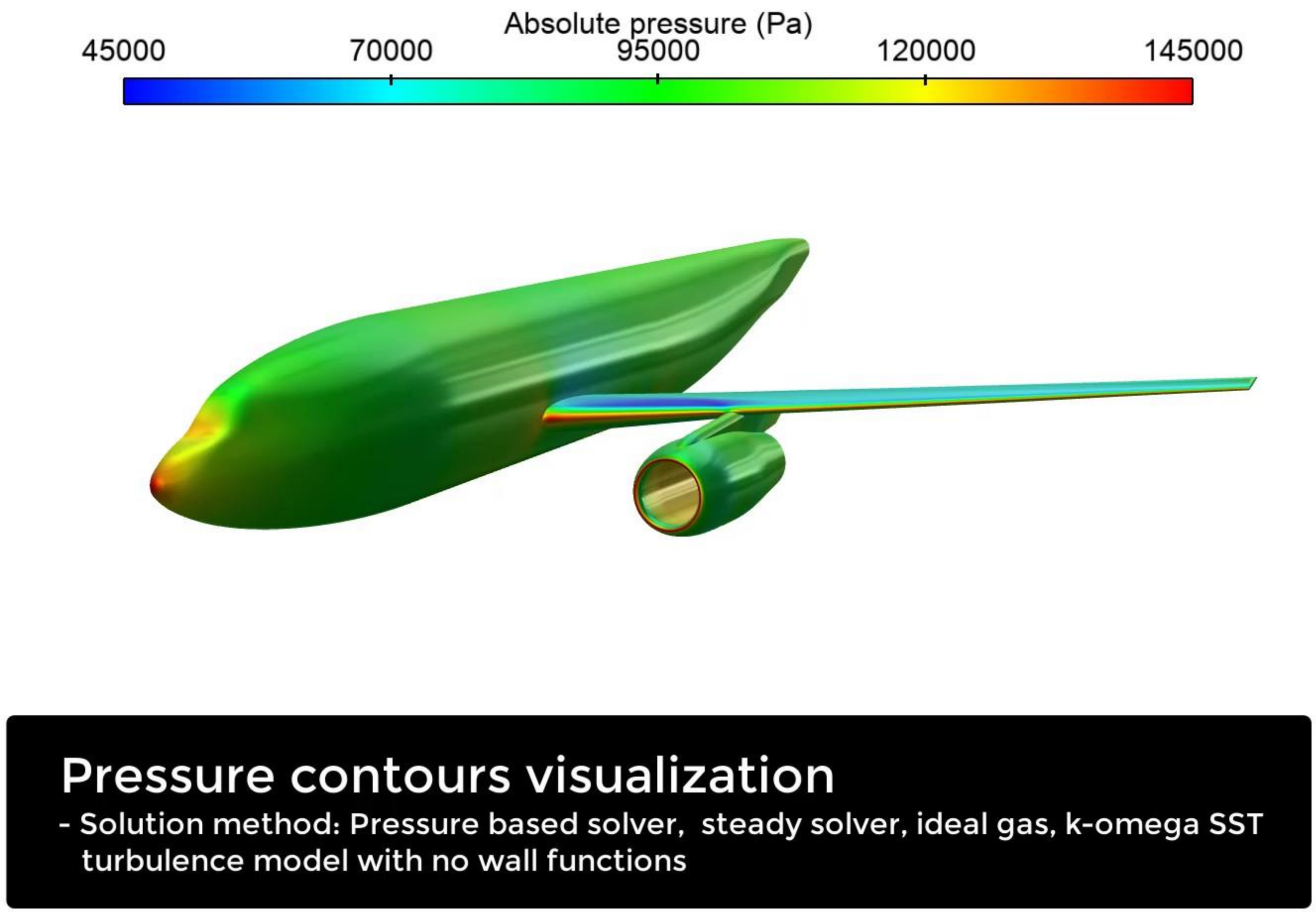
DLR-F6 aircraft model – RANS simulation



Computational domain and boundary conditions
- To reduce the ell count, symmetry is used

https://youtu.be/DY6QfKk3N-A

DLR-F6 aircraft model – RANS simulation



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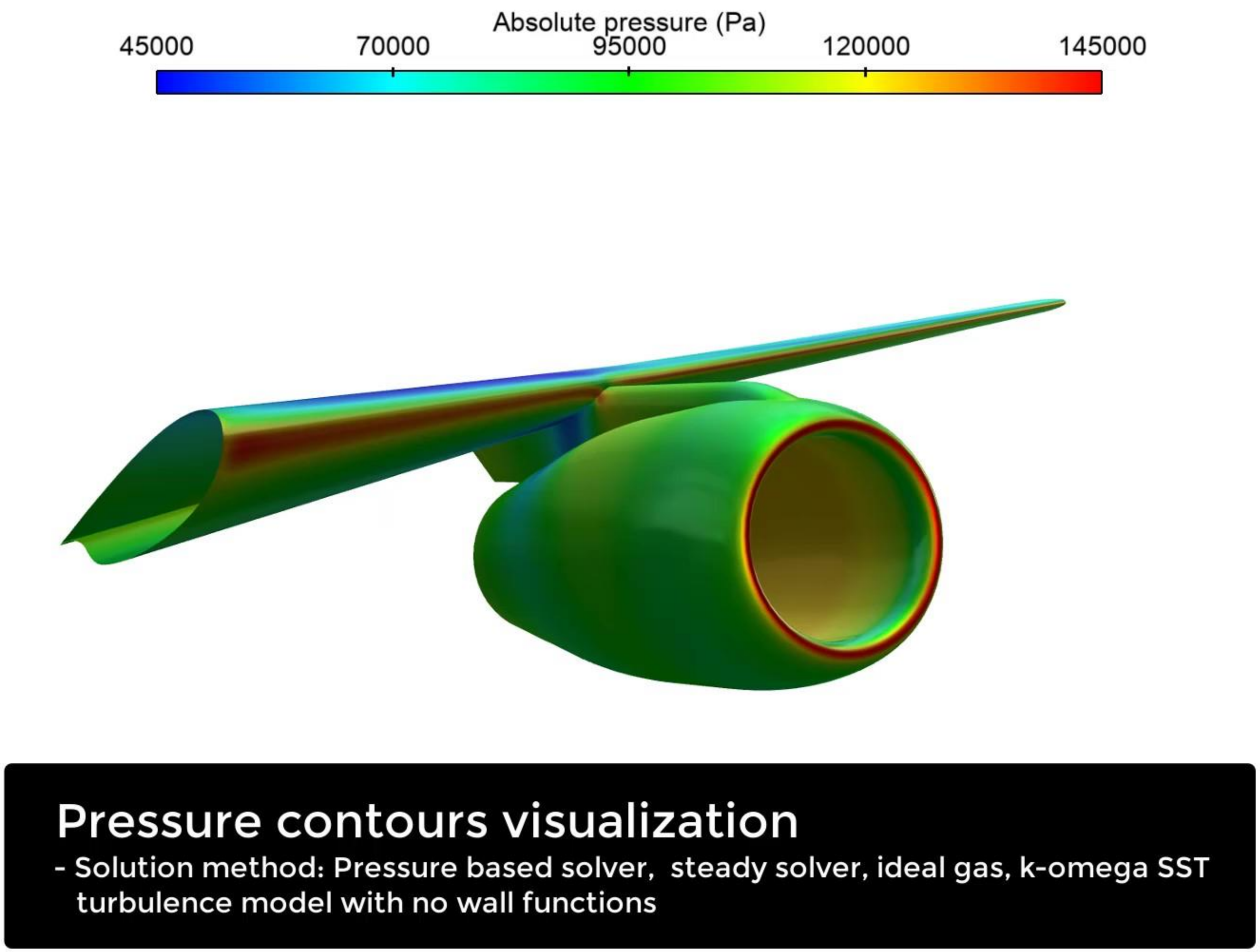
DLR-F6 aircraft model – RANS simulation



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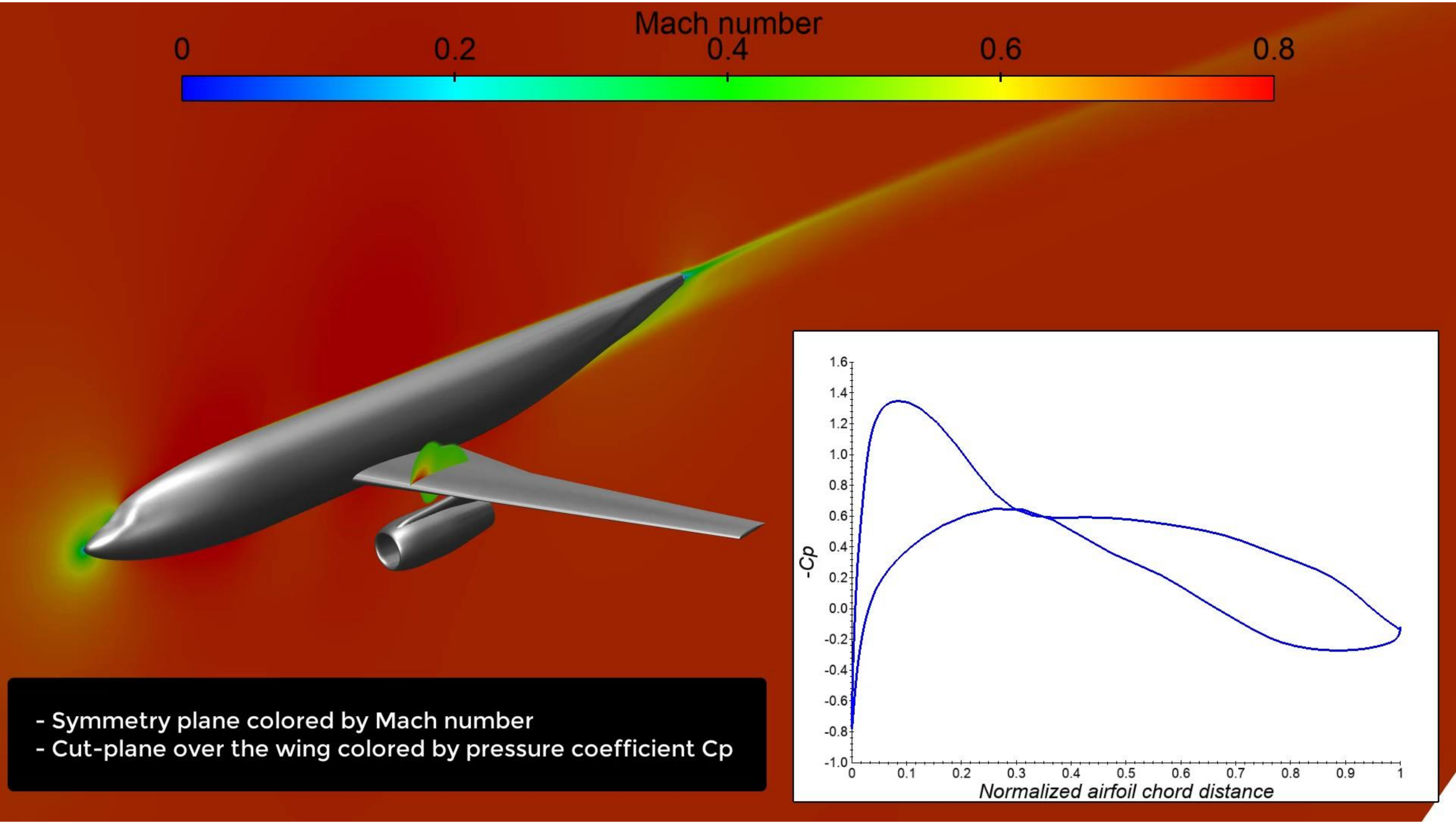
DLR-F6 aircraft model – RANS simulation



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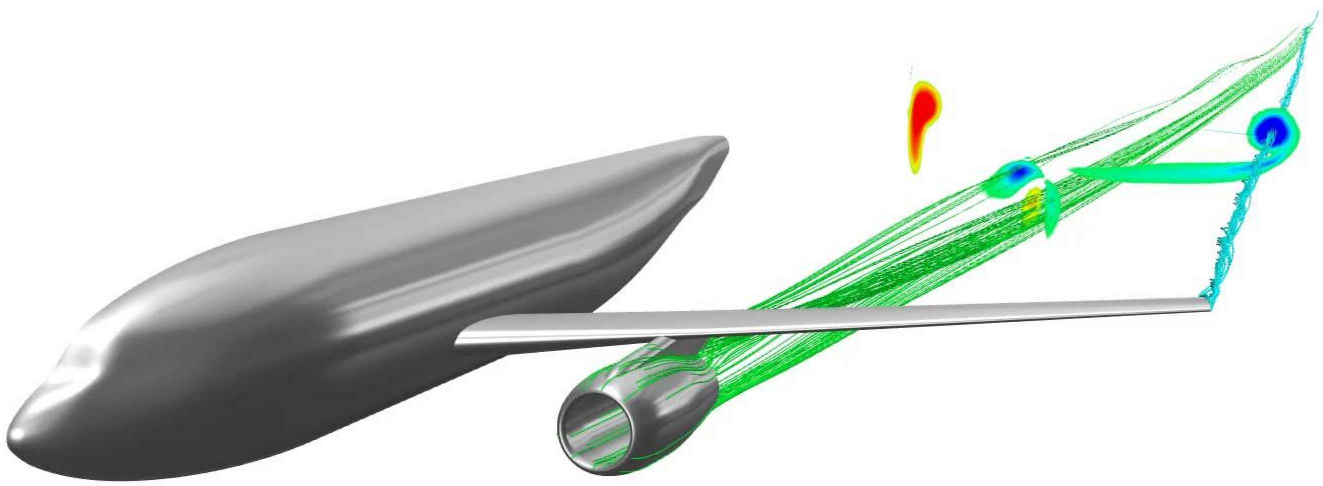
DLR-F6 aircraft model – RANS simulation



- Streamlines released from the wing-tip (cyan) and engine nacelle (green)
- The Wake behind the airplane is visualized using vorticity contours.
- Blue represents counter-clockwise rotation and red colckwise rotation

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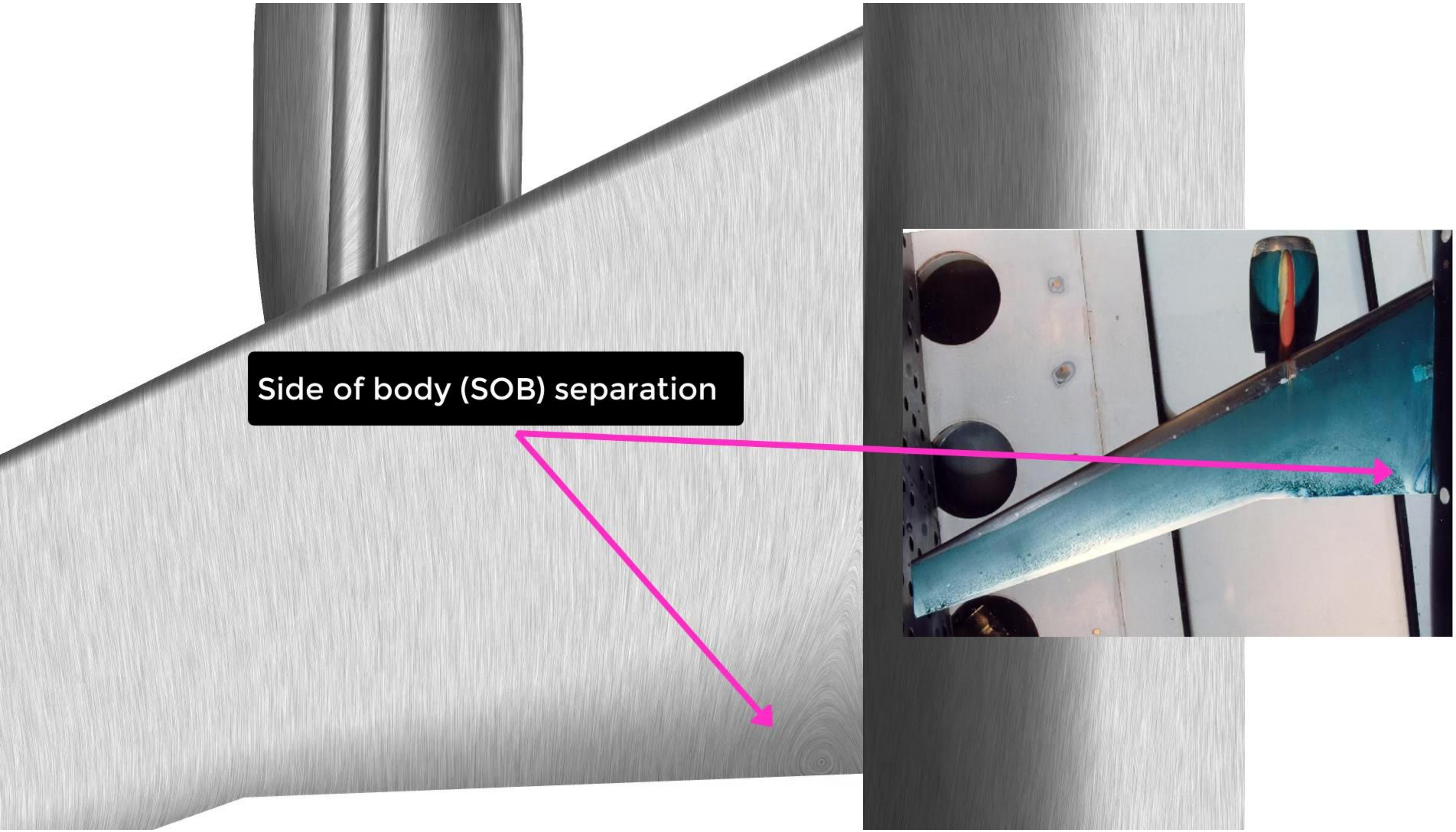
DLR-F6 aircraft model – RANS simulation



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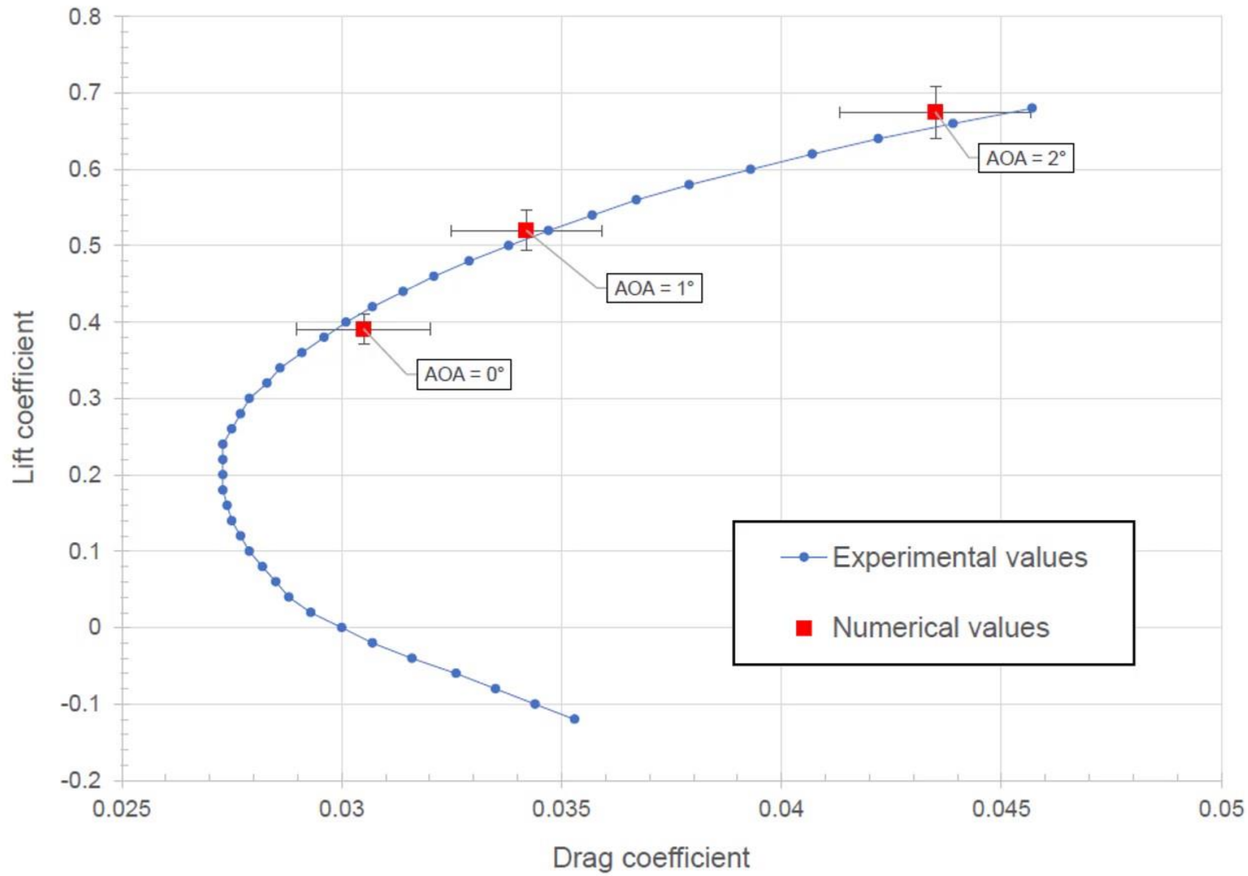
DLR-F6 aircraft model – RANS simulation

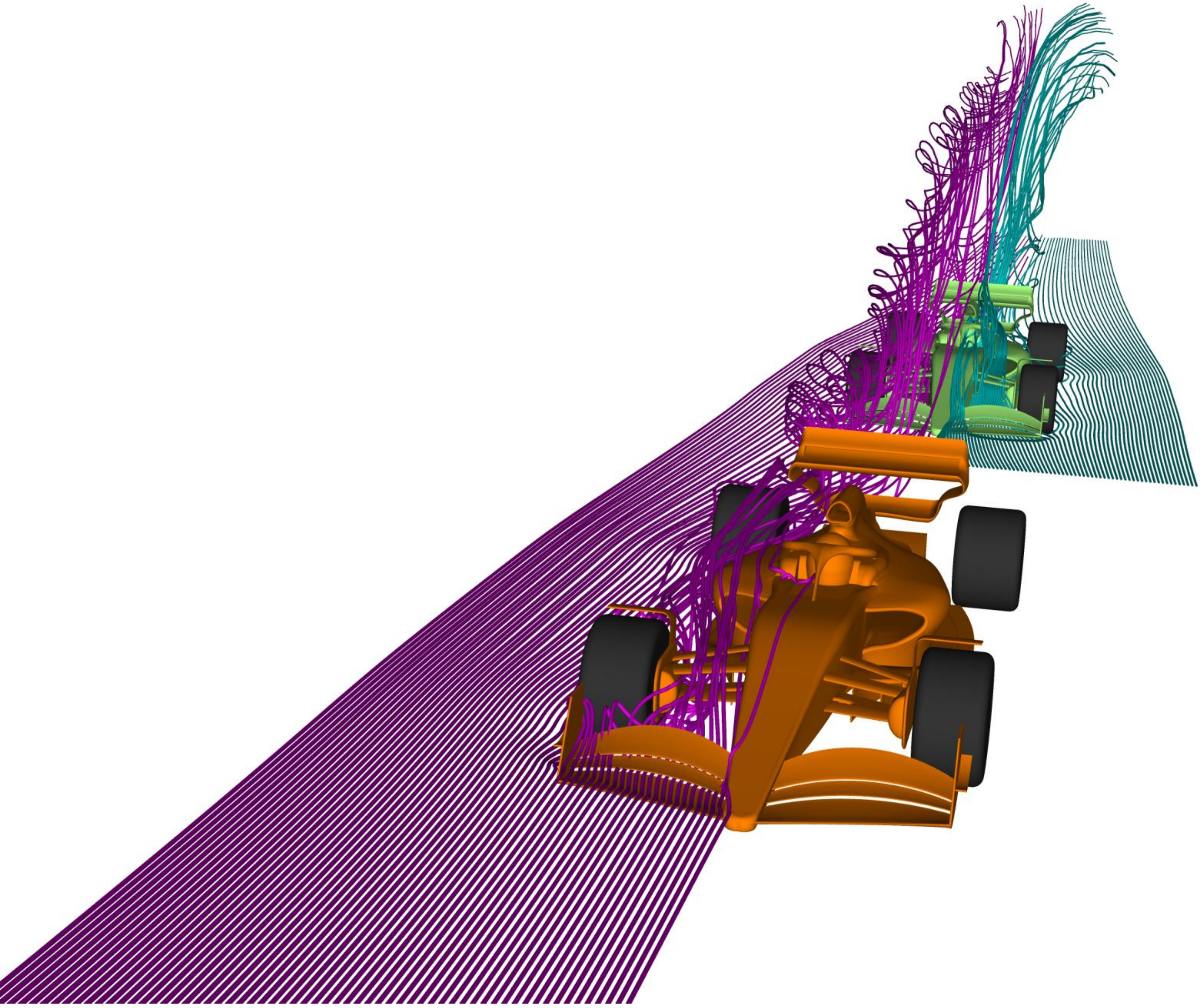


Polar plot (numerical results are plotted with 5% error bars)

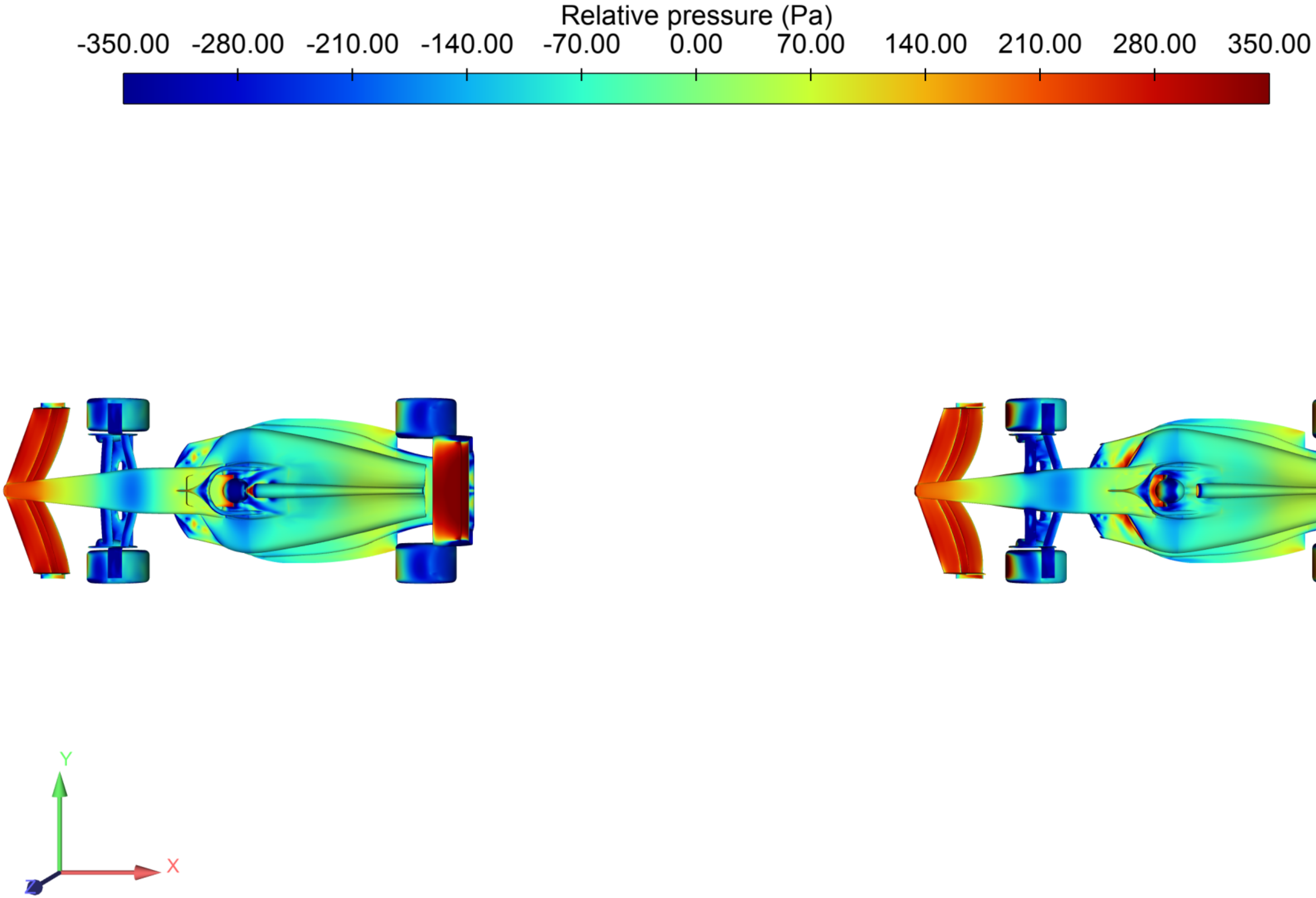
https://youtu.be/DY6QfKk3N-A

F1 in platoon formation – RANS simulation

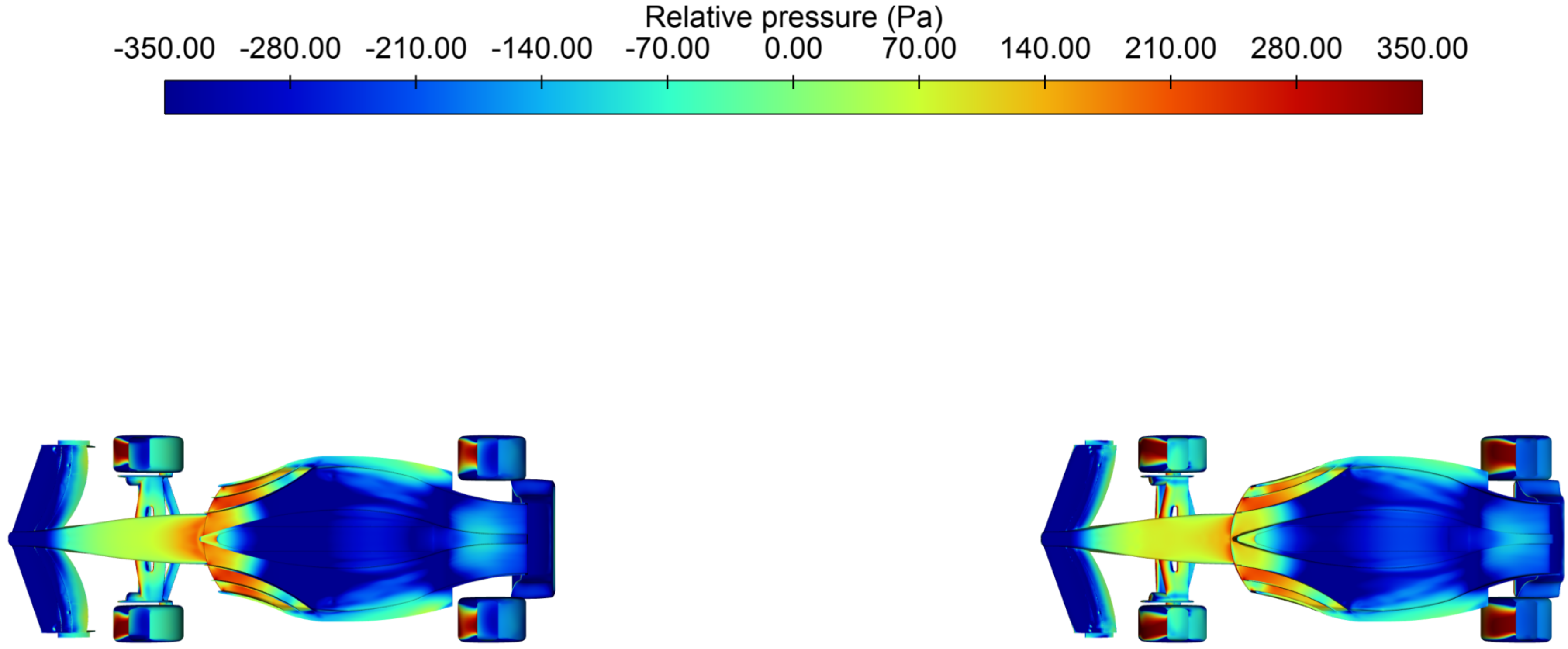
F1 in platoon formation – RANS simulation



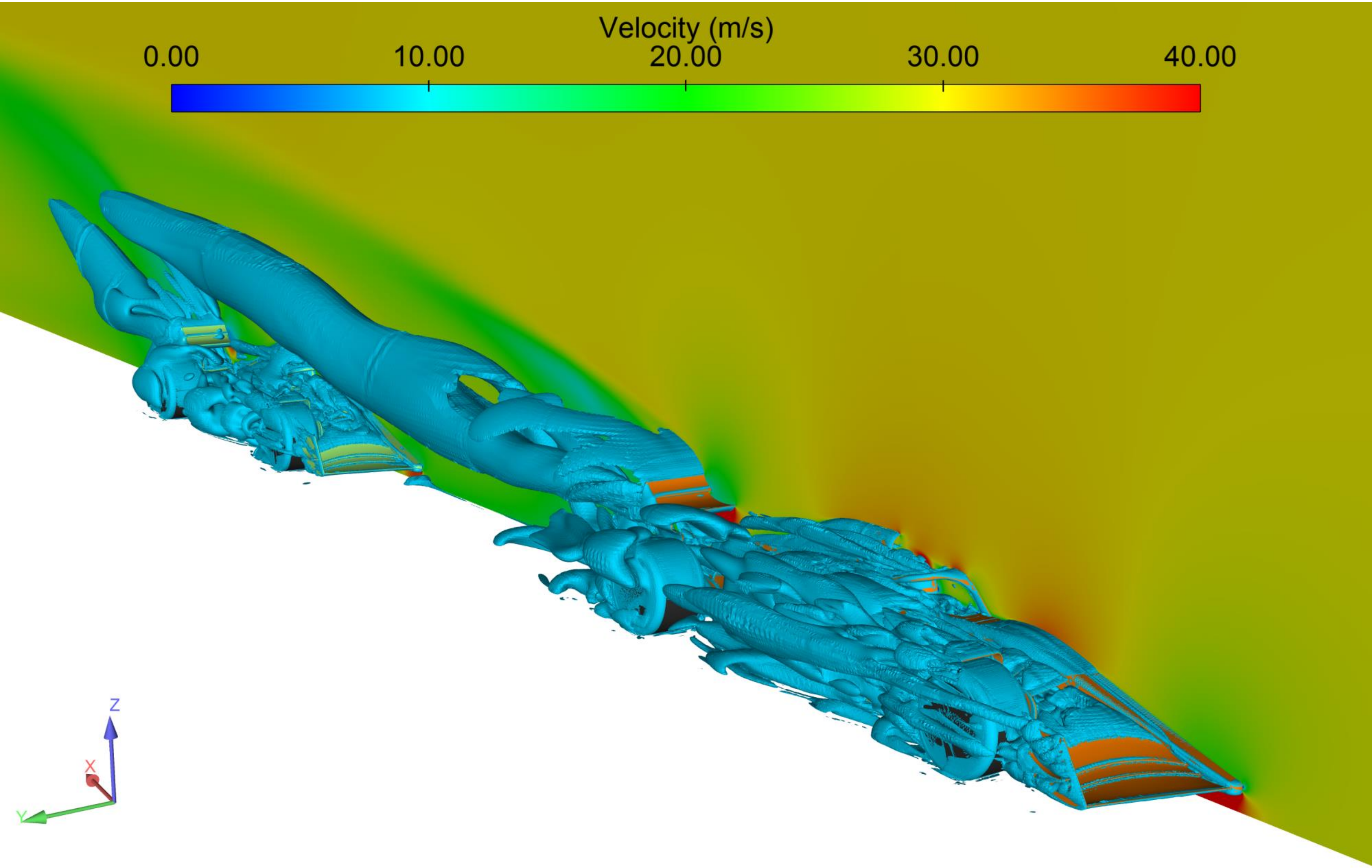
F1 in platoon formation – RANS simulation



F1 in platoon formation – RANS simulation



F1 in platoon formation – RANS simulation



F1 in platoon formation – RANS simulation