FLEXCOMPUTE

Towards Fast and Accurate DrivAer Simulations

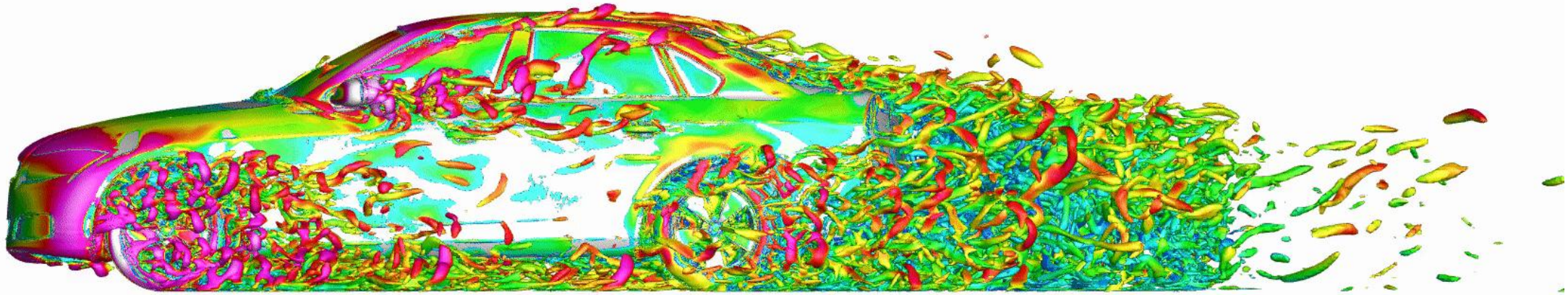
AutoCFD5

Roberto Della Ratta Rinaldi

8th October 2026

EXECUTIVE SUMMARY

- Meshing Strategy
- Solver settings
- Effect of Delta T
- Geometrical Delta
- Low dissipation scheme
- Shielding function



One automated pipeline from dirty CAD to result.

01
Geometry import
Intake any geometry

02
Geometry clean-up
Automated fixing · AI-native representation

03
Meshing
Automated, high-quality mesh generation

04
Solver setup
AI agents choose conditions, fidelity, physics

05
Solver
GPU-accelerated · 10–100× faster · multiphysics

06
Post-processing
3D visualization · live analysis · automated report

GEOMETRY AI

Solver-ready geometry from any CAD

FLOW360

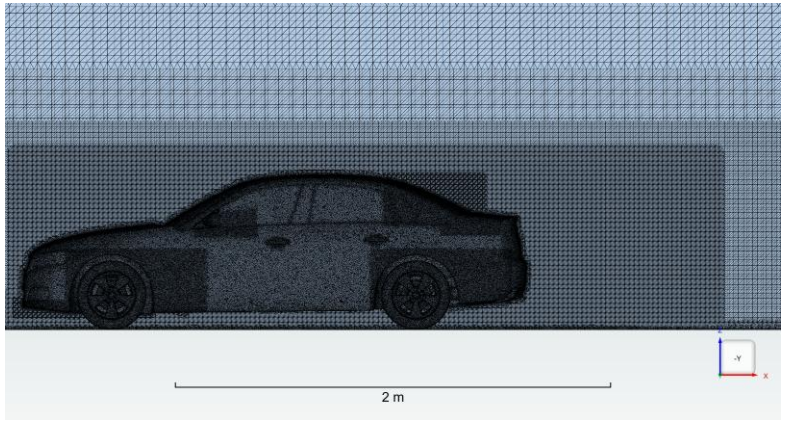
Automated GPU CFD · post-processing

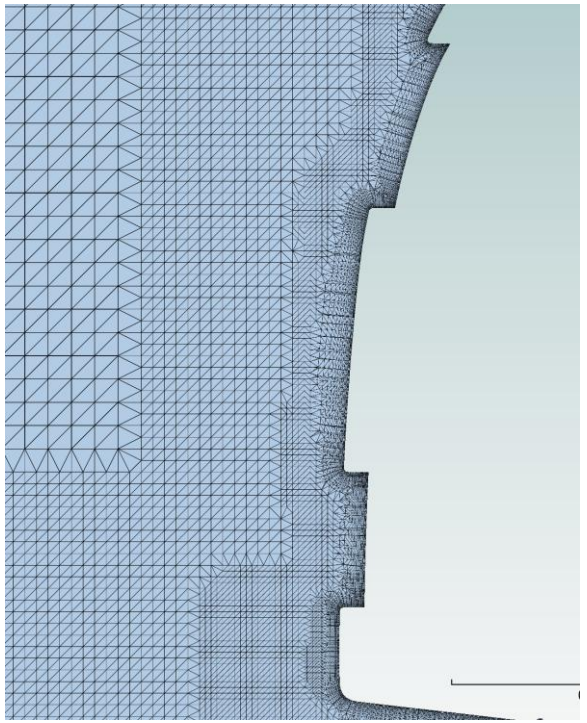
Every step is scriptable — the pieces an AI agent needs to run CFD end to end, from CAD to result.

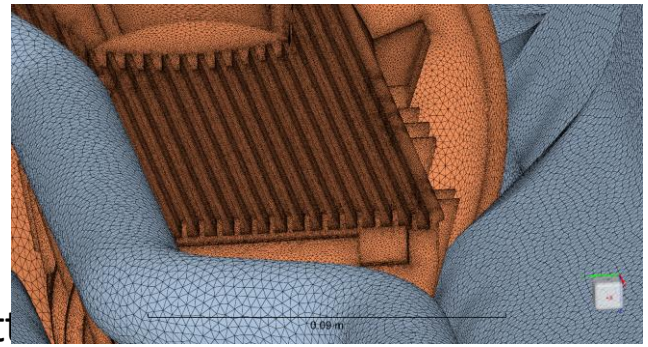
Proprietary and Confidential

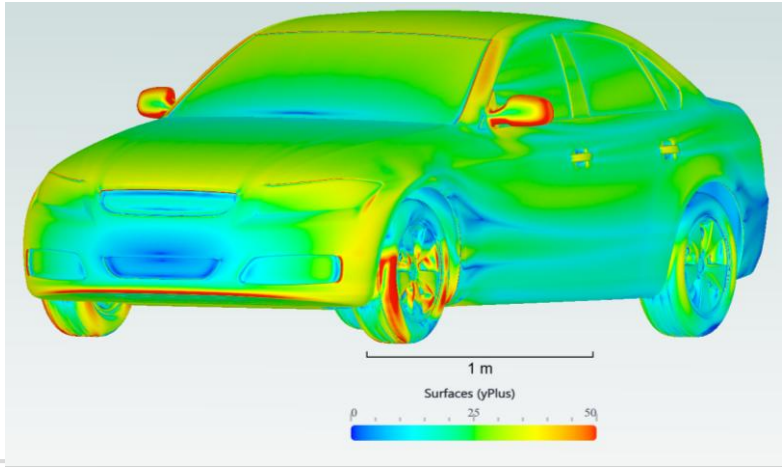
Mesh- Geometry AI

- **33min** Surface Mesh (72GB RAM peak)
  - Automatically Closed gaps
  - Solved intersections
  - Inflate baffles
  - All features retained
  - Mathematically watertight and manifold mesh
- **40min** Volume mesh
- Python scripted or WebUi
- 203M Nodes ~230M Cells
- Same refinements as committ
- Wall functions (y+ <50)









Solver strategy

A. RANS Initialisation

B. DDES coarse dt=5e-3s t=0.75s

C. DDES fine dt=1e-3s t=3s – Averaging 2s

D. DDES extra fine dt=2.5e-4s t=3s – Averaging 2s

- K Omega SST
- Wall Functions
- Alpha1=0.41 (instead of 0.31 default)- Best Practise to avoid front splitter separation

Computational Time

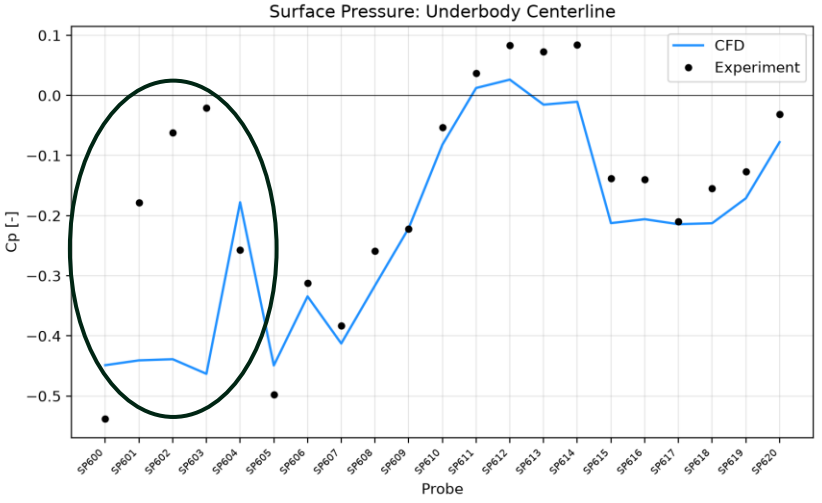
Fully Compressible

203M nodes ~ 230MCells

15min RANS

4.5hrs DDES 16B200 - GPU

DDES with Default Alpha1



FLEXCOMPUTE

Effect of Dt

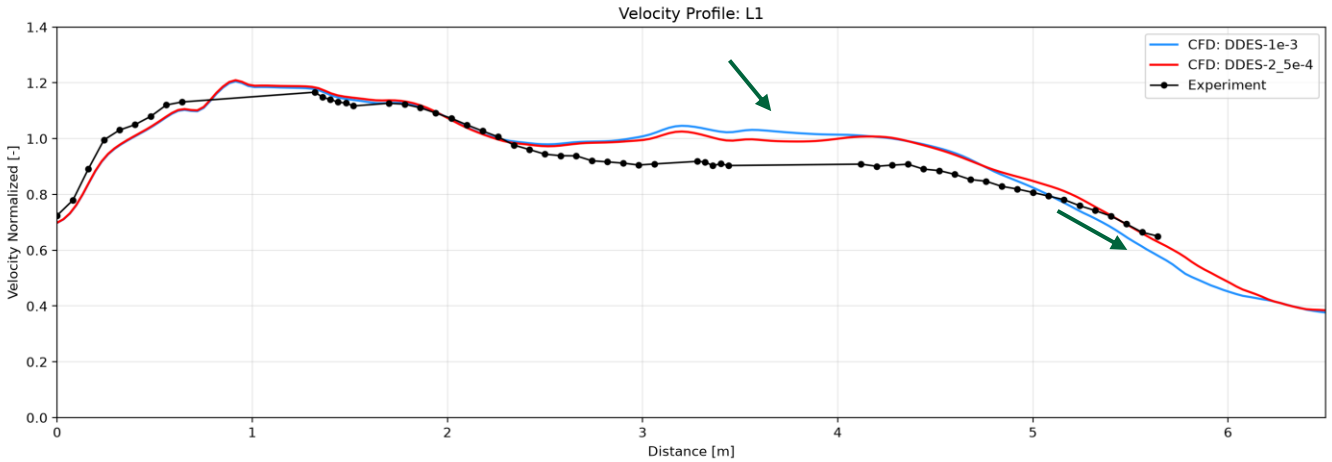
A.	RANS Initialisation		
B.	DDES coarse	dt=5e-3s	t=0.75s
C.	DDES fine	dt=1e-3s	t=3s – Averaging 2s
D.	DDES extra fine	dt=2.5e-4s	t=3s – Averaging 2s

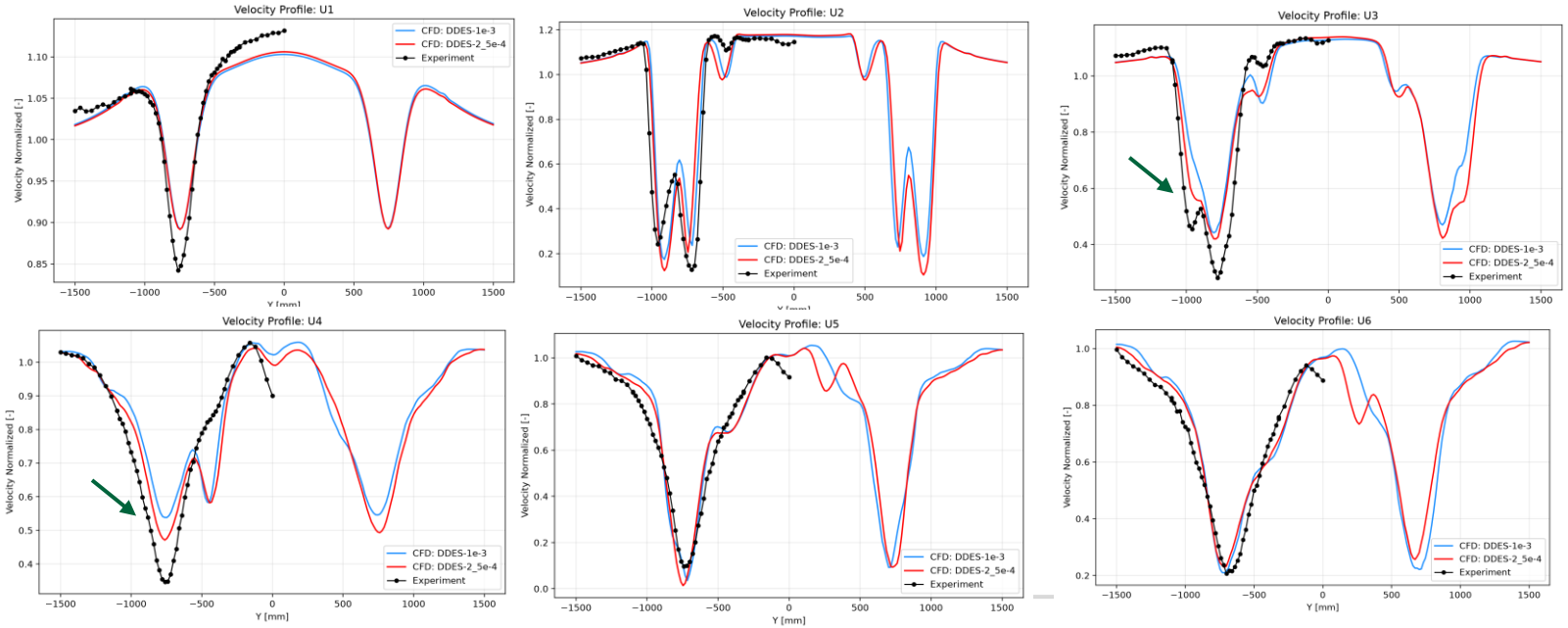
- Comparison of DDES fine with DDES Extra fine
- Fine 1.8hr
- Extra fine 5hr . Is it worth 3hr more?
- Forces same ballpark, slightly better CD
- Velocity profiles better in L1 slope but overall trends are already captured by the fine DDES

CD Fine = 0.2611 (+6.5cts)

↓

CD Extra fine =0.2601 (+5.5cts)





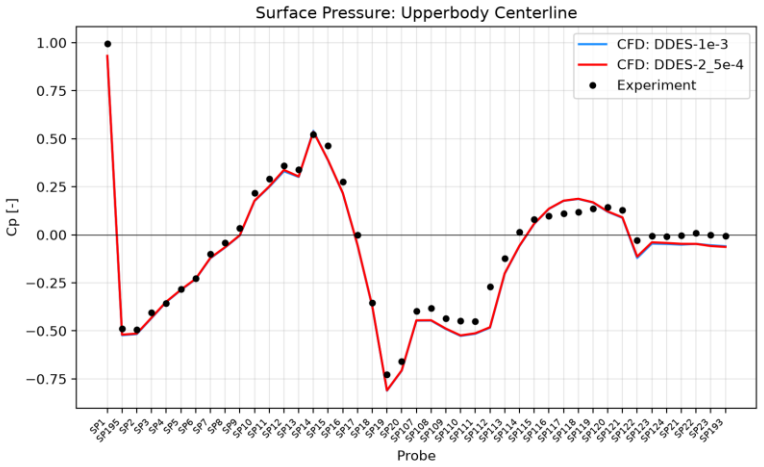
Proprietary and Confidential

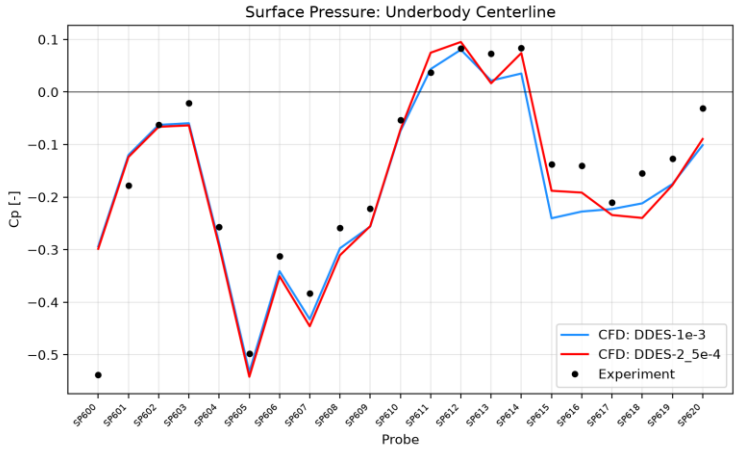
FLEXCOMPUTE

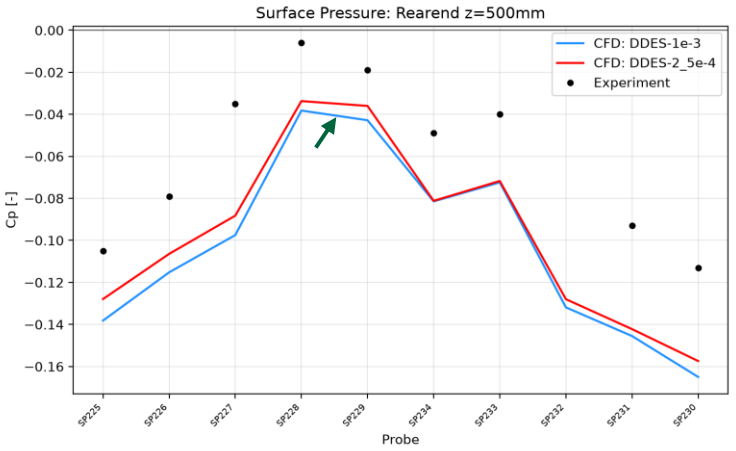
Effect of Dt

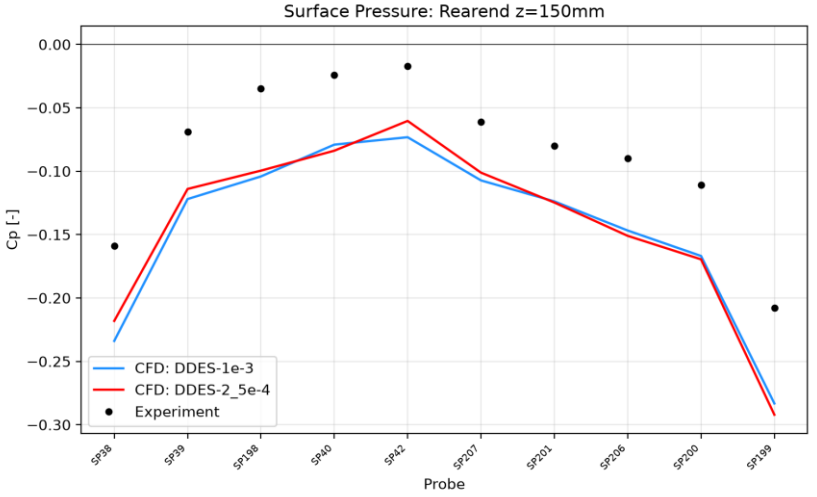
- Similar accuracy in pressure
- Slightly better at the rear

A.	RANS Initialisation		
B.	DDES coarse	dt=5e-3s	t=0.75s
C.	DDES fine	dt=1e-3s	t=3s – Averaging 2s
D.	DDES extra fine	dt=2.5e-4s	t=3s – Averaging 2s







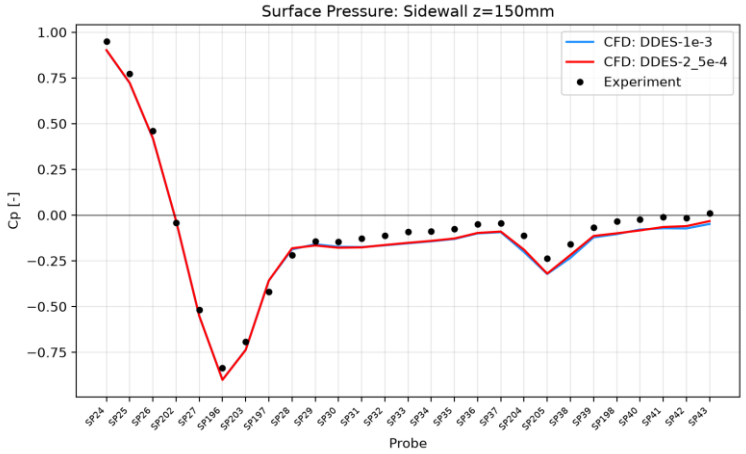


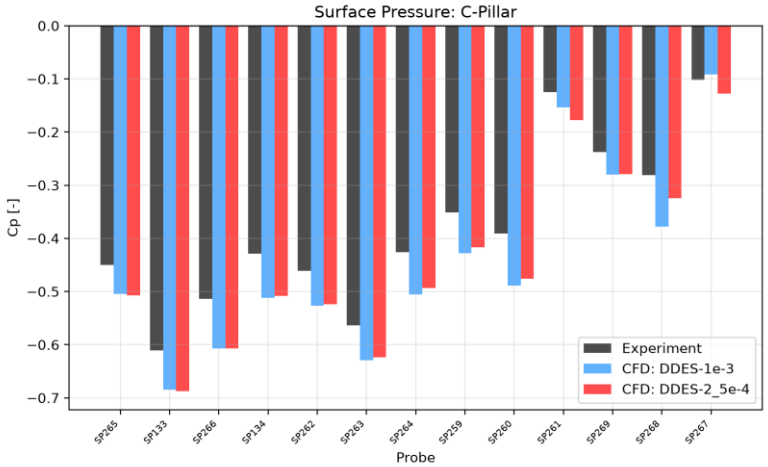
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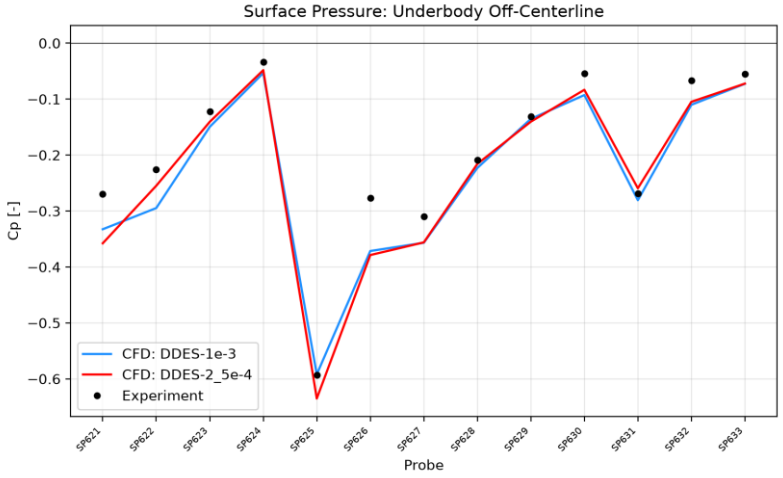
Effect of Dt

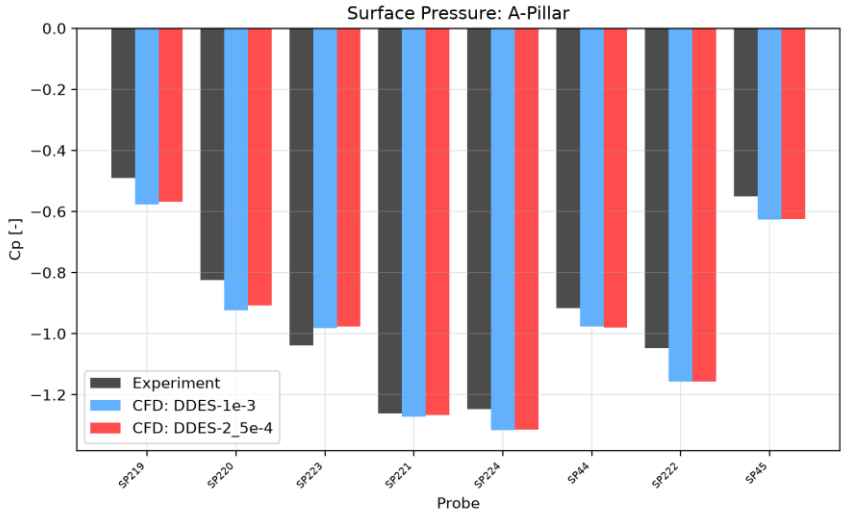
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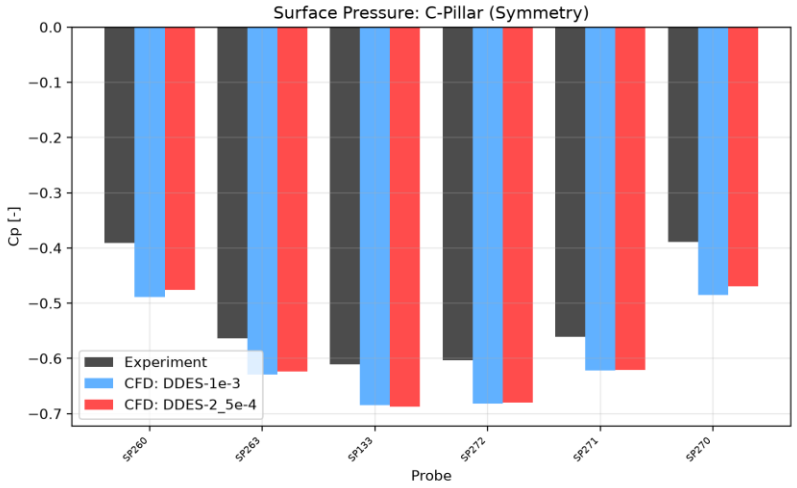
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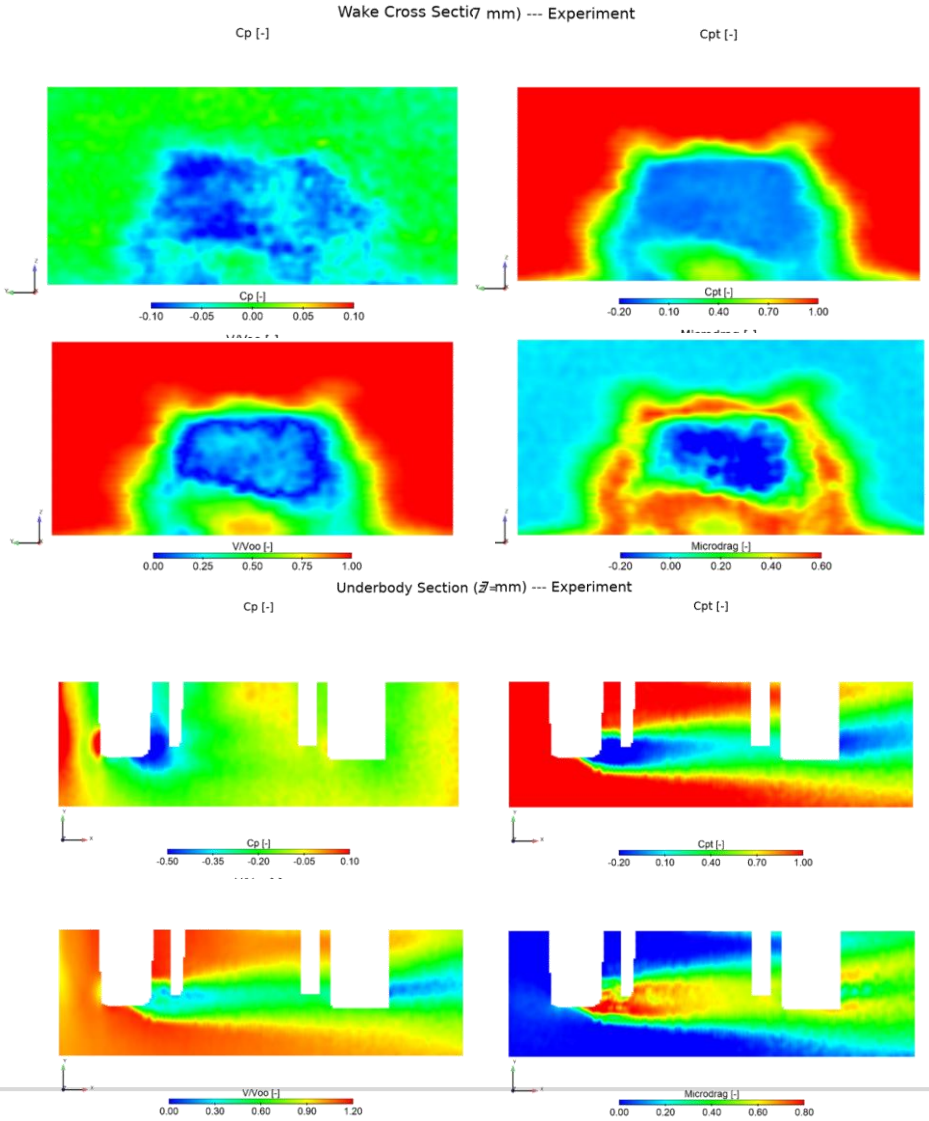


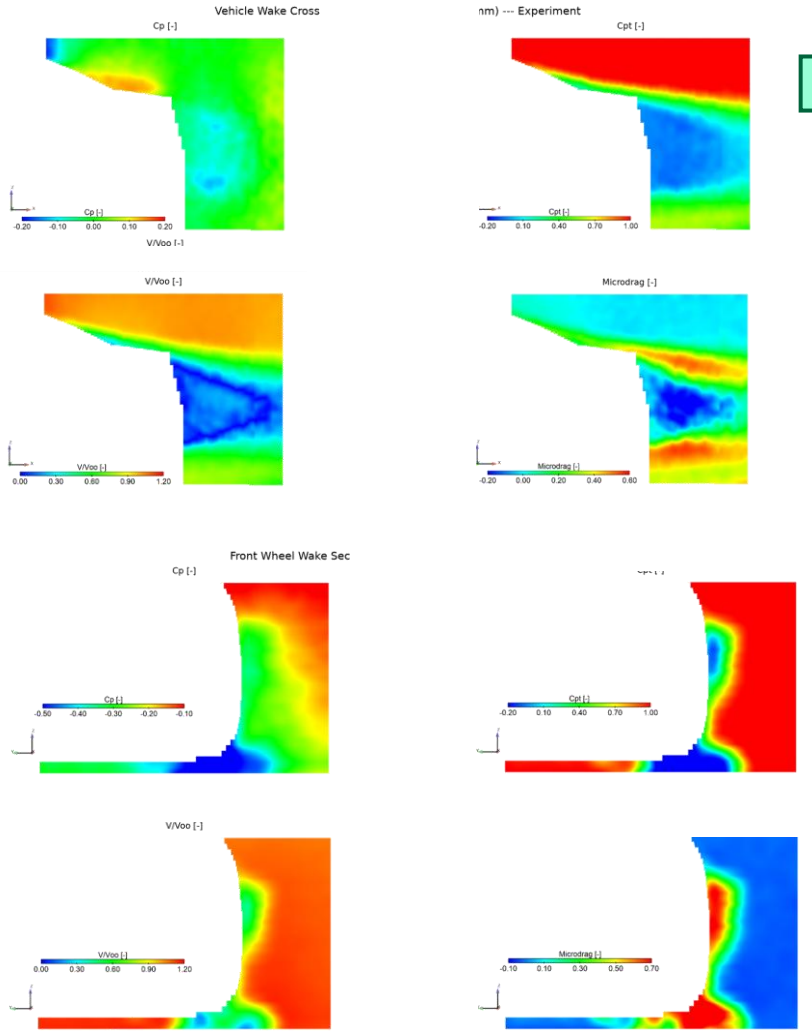


FLEXCOMPUTE

Flowfield- experimental data

A.	RANS Initialisation		
B.	DDES coarse	dt=5e-3s	t=0.75s
C.	DDES fine	dt=1e-3s	t=3s – Averaging 2s
D.	DDES extra fine	dt=2.5e-4s	t=3s – Averaging 2s



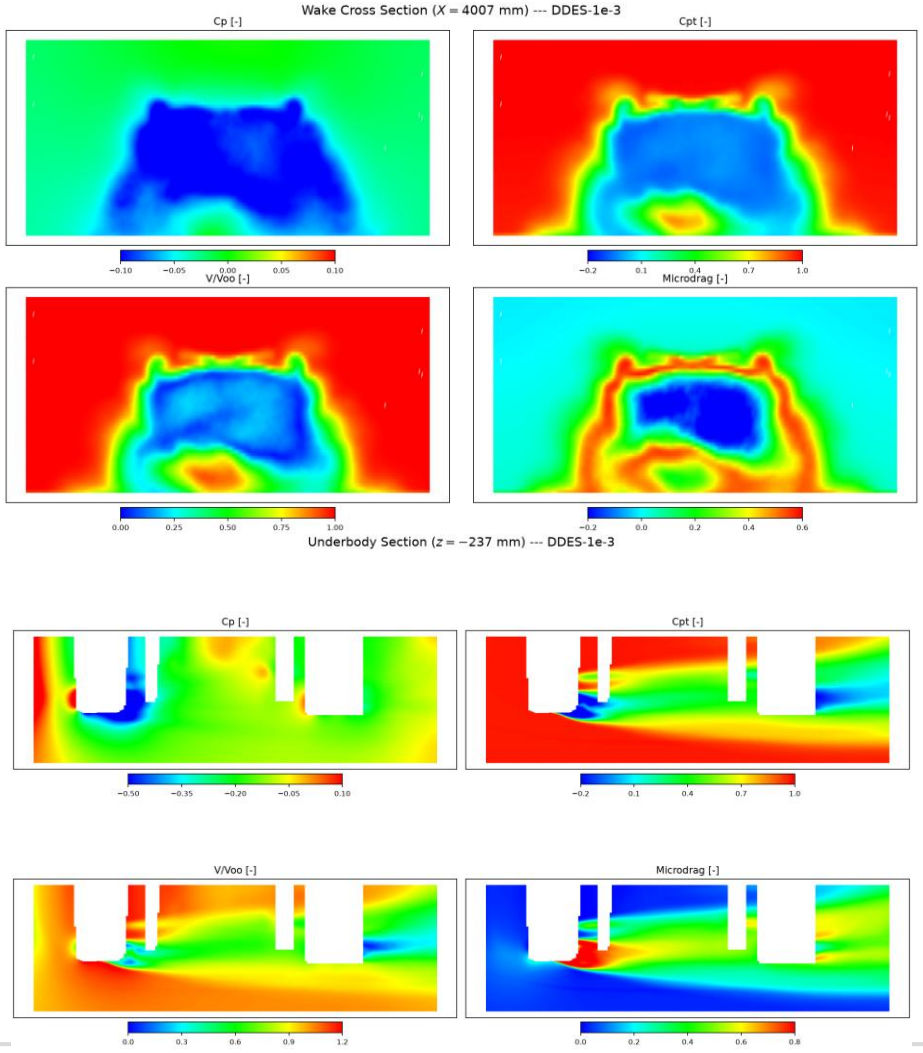


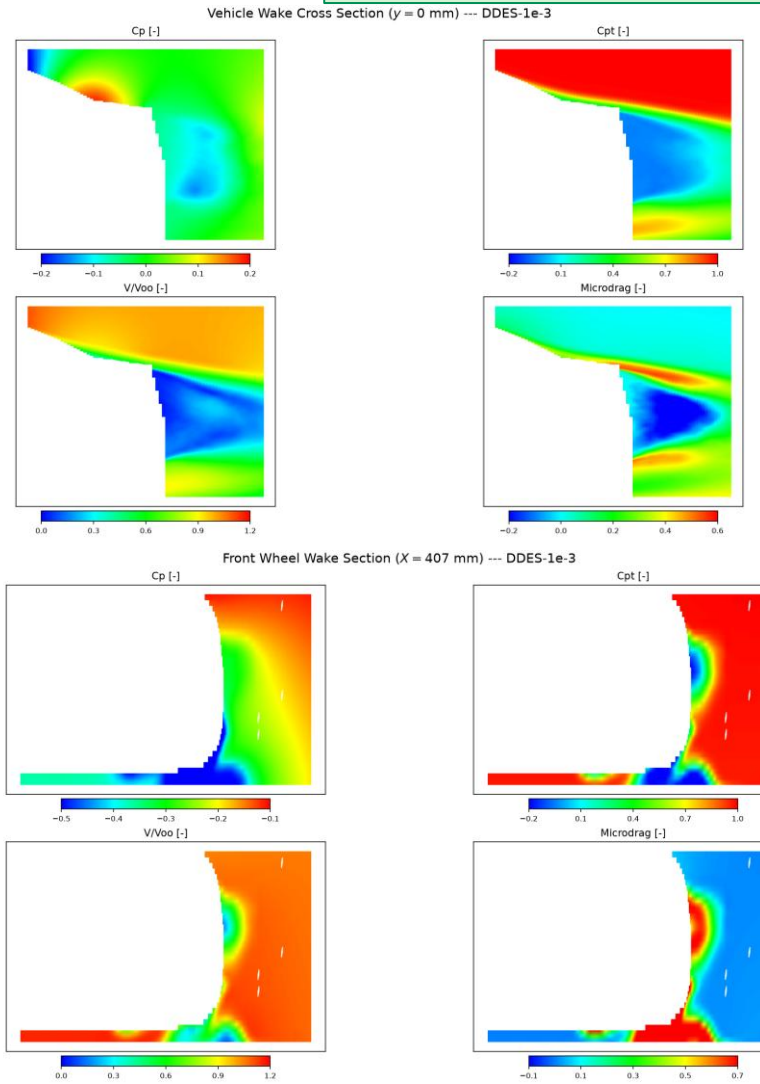
Exp	Fine	ExtraFine

FLEXCOMPUTE

Flowfield- DDES Fine

A.	RANS Initialisation		
B.	DDES coarse	dt=5e-3s	t=0.75s
C.	DDES fine	dt=1e-3s	t=3s – Averaging 2s
D.	DDES extra fine	dt=2.5e-4s	t=3s – Averaging 2s



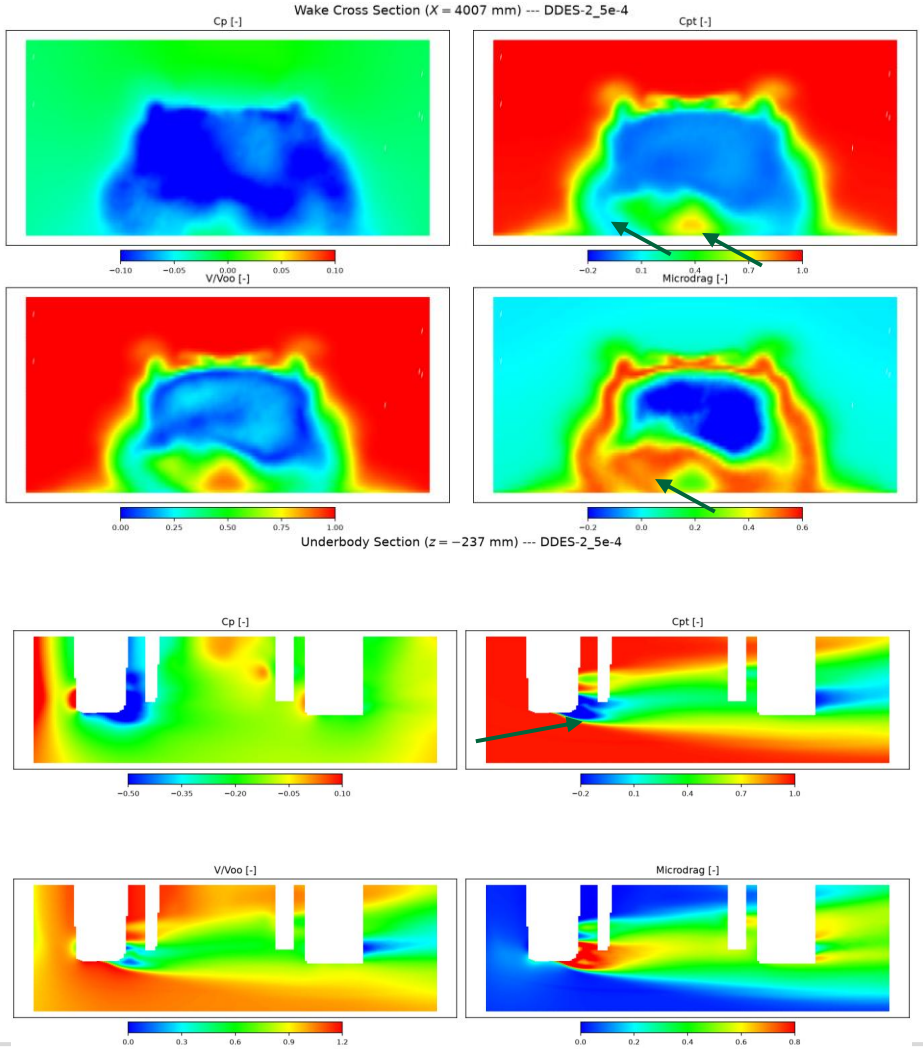


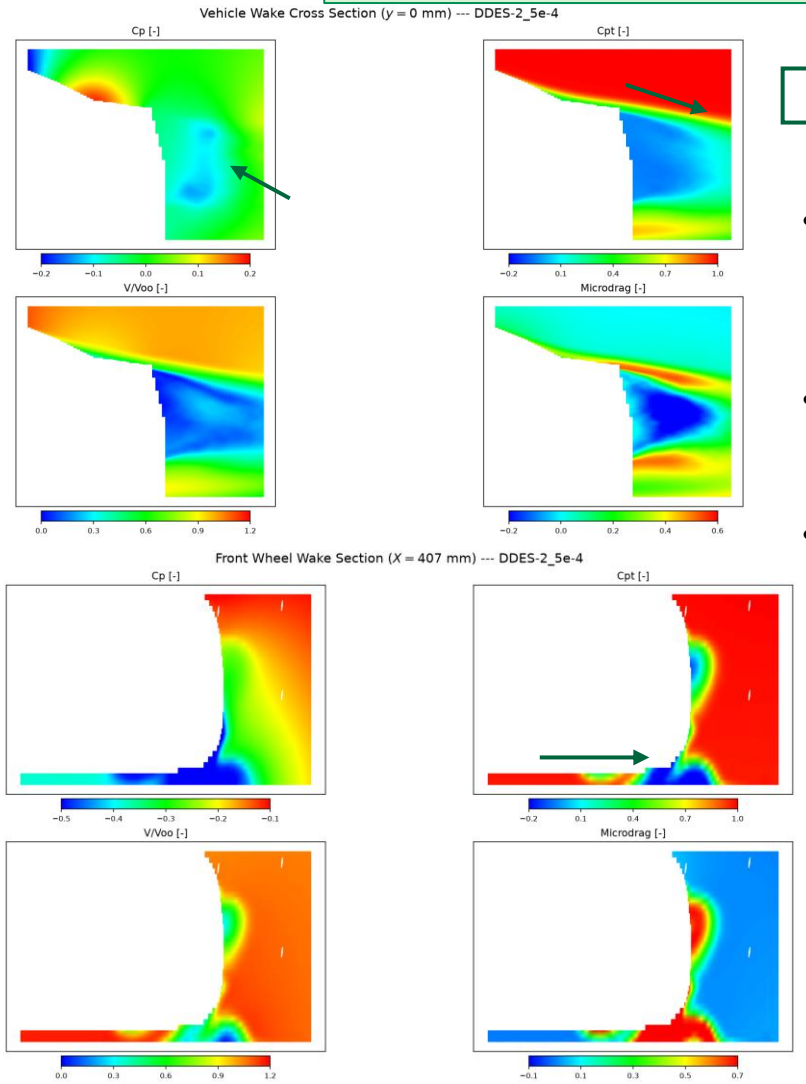
Exp	Fine	ExtraFine

FLEXCOMPUTE

Flowfield- DDES Extra fine

A.	RANS Initialisation		
B.	DDES coarse	dt=5e-3s	t=0.75s
C.	DDES fine	dt=1e-3s	t=3s – Averaging 2s
D.	DDES extra fine	dt=2.5e-4s	t=3s – Averaging 2s





Exp	Fine	ExtraFine

- the rear wake goes less bulky on the left arm and the central high energy patch reduces
- Better downwash of the rear wake

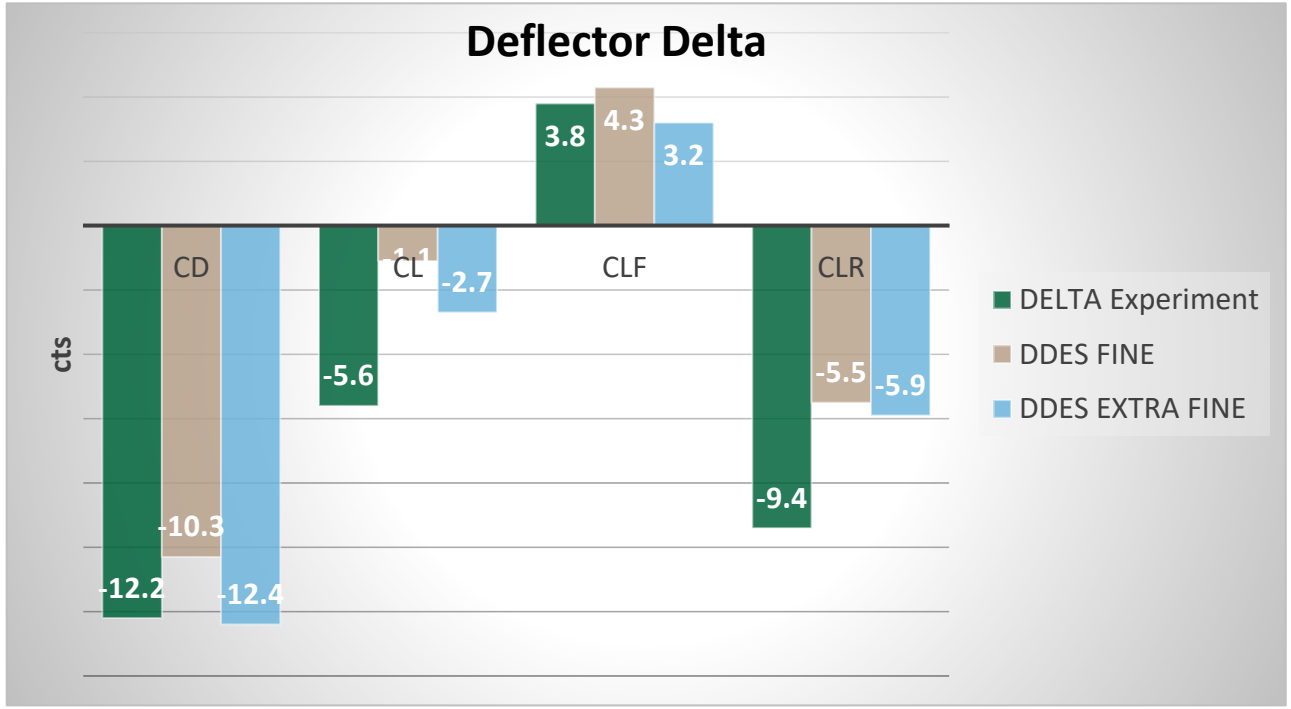
- FWW moves outboard but the separation is not as strong as in exp

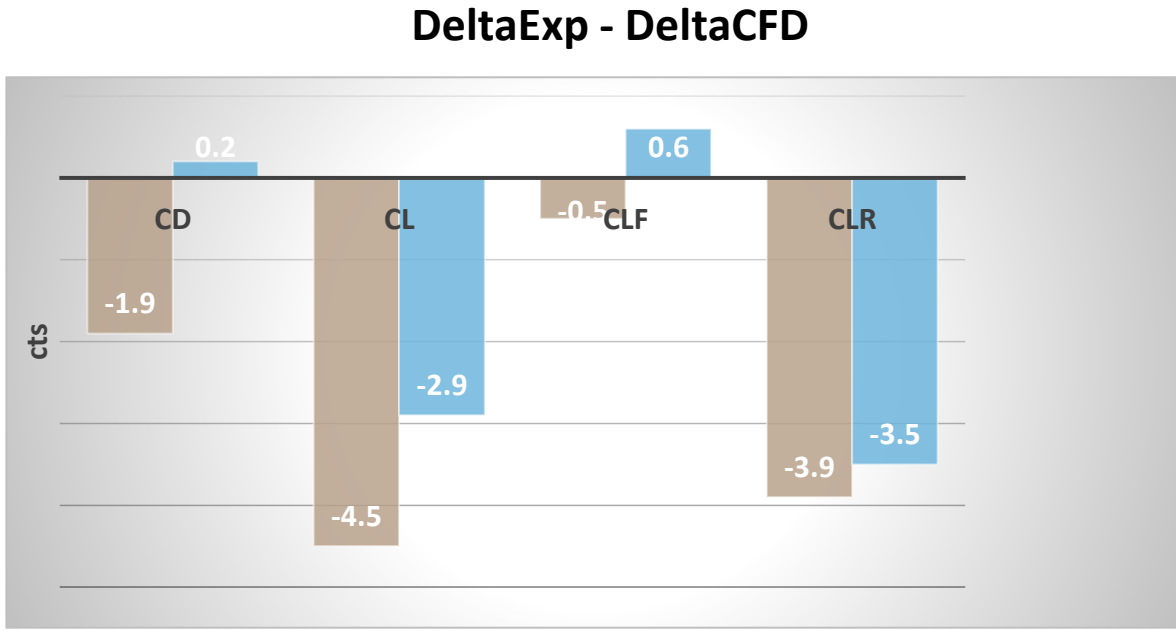
FLEXCOMPUTE

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Deflector delta

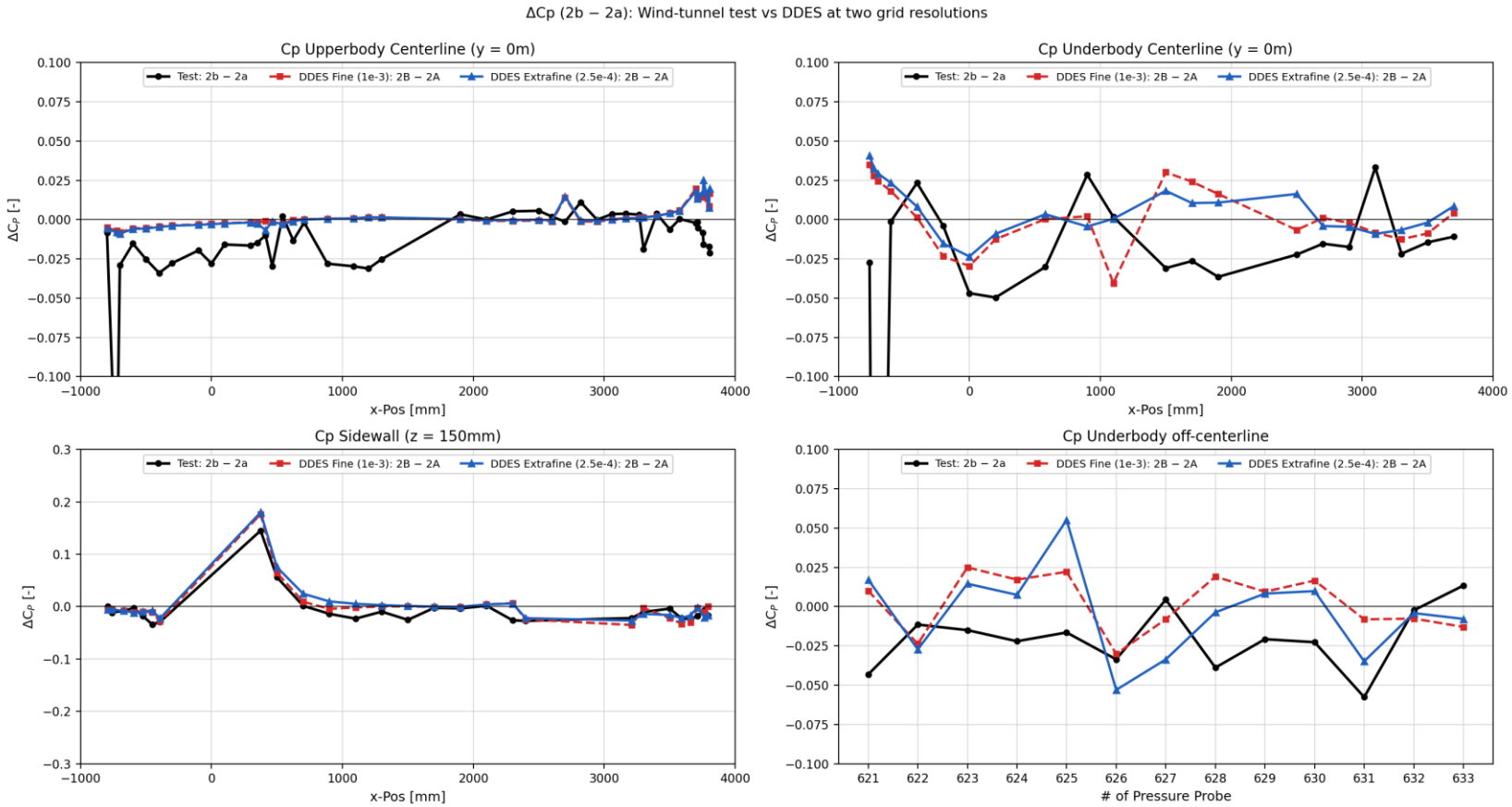
- DDES Extra fine is more accurate although DDES Fine predicts all the trends correctly and the magnitude is not far off





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Geometrical Delta



- Delta Surface pressure. WT Upper body shows some delta, whereas CFD is neutral
- Underbody is a bit noisy and side walls is where best correlation is

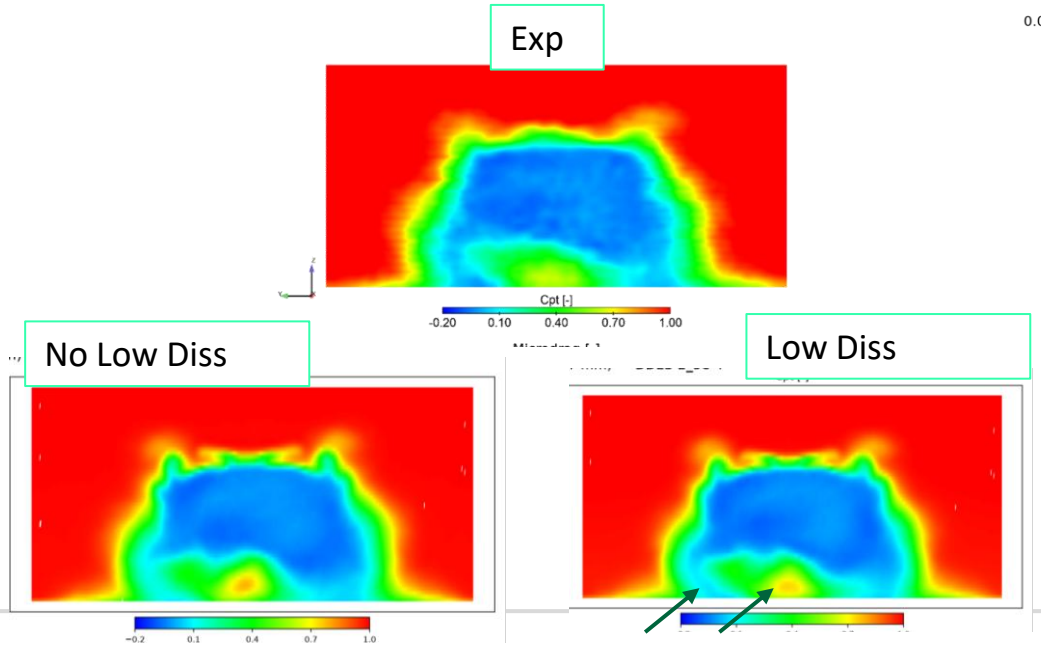
Low Dissipation scheme

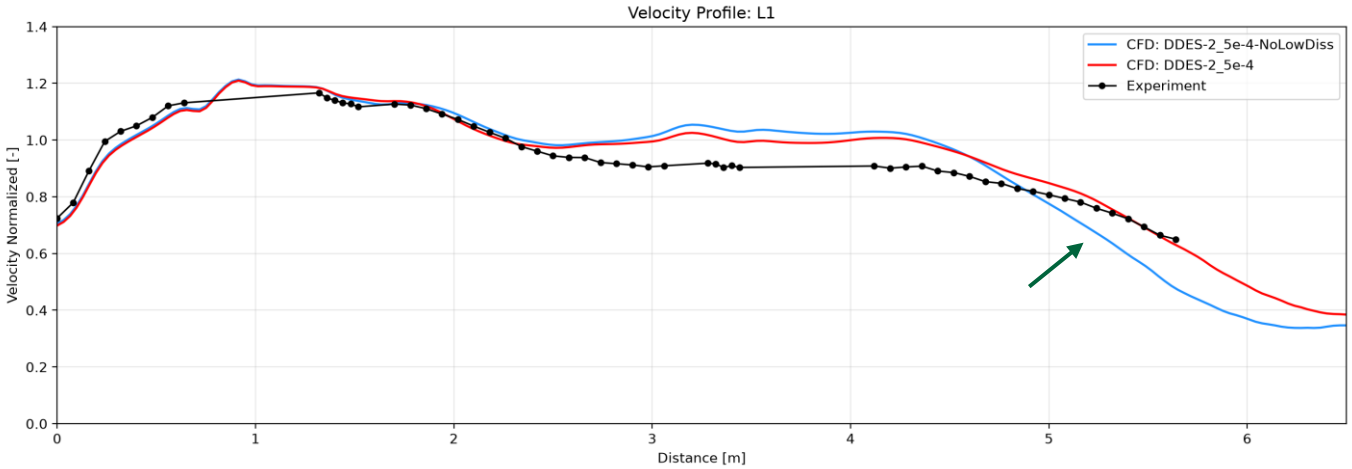
- Baseline is with Low dissipation scheme , central scheme with very little upwind content
- Without it, the flow dissipates more and accuracy gets worse overall

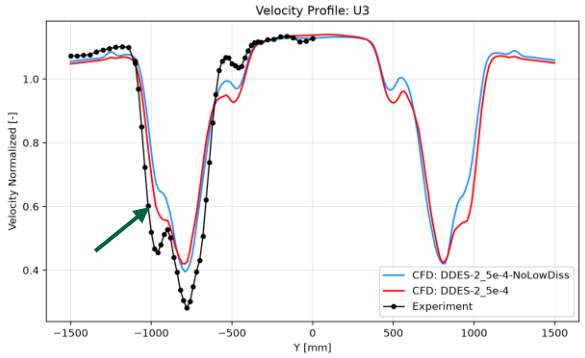
CD No Low Diss = 0.2689 (+14cts)

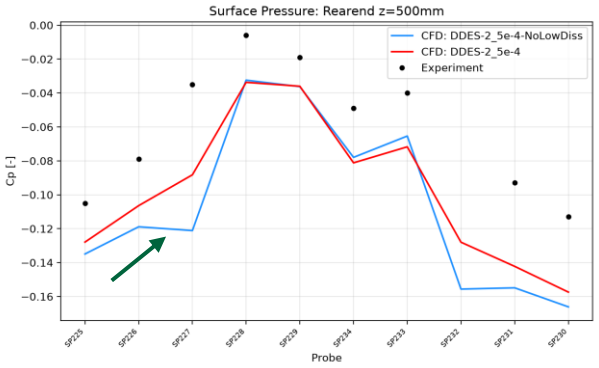
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CD Low Diss = 0.2601 (+5.5cts)

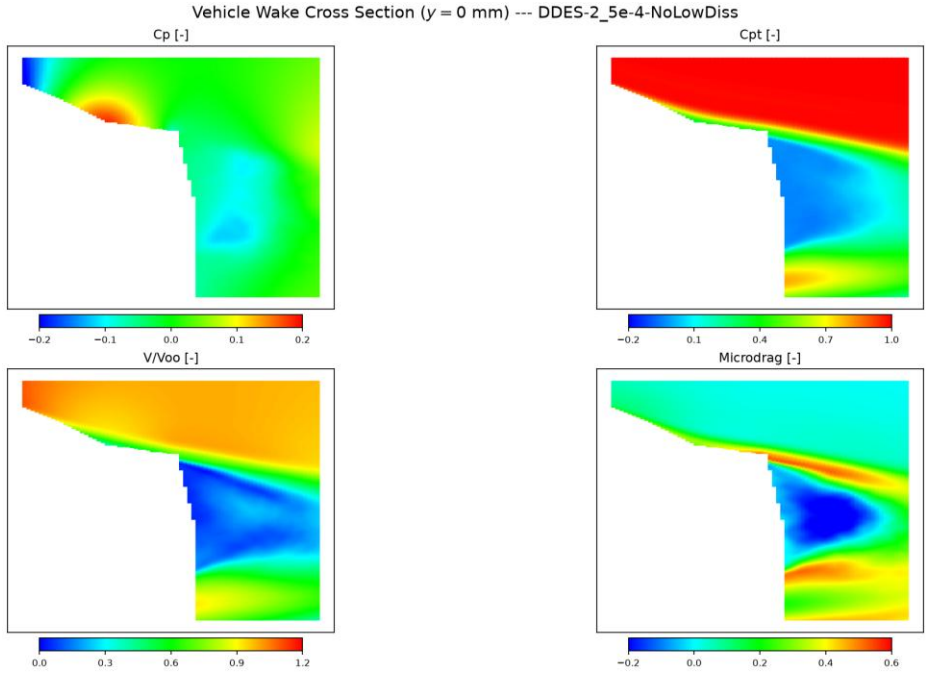


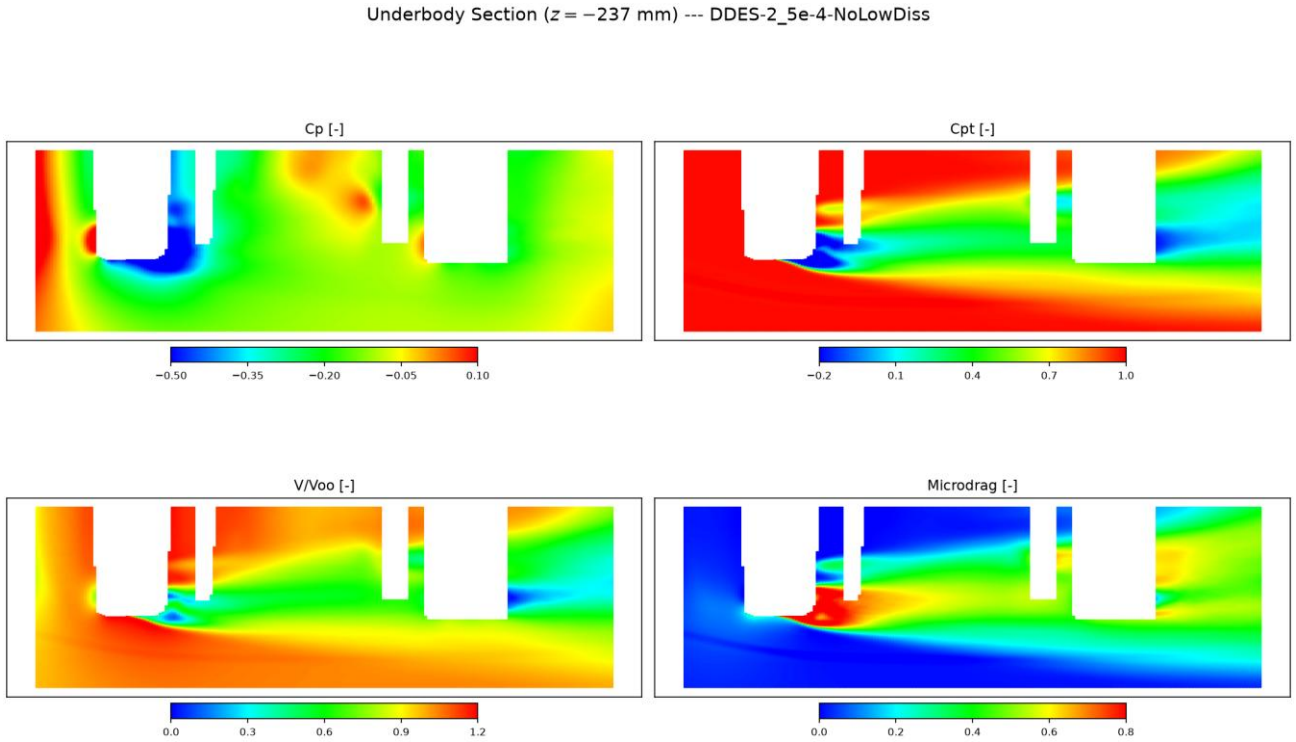




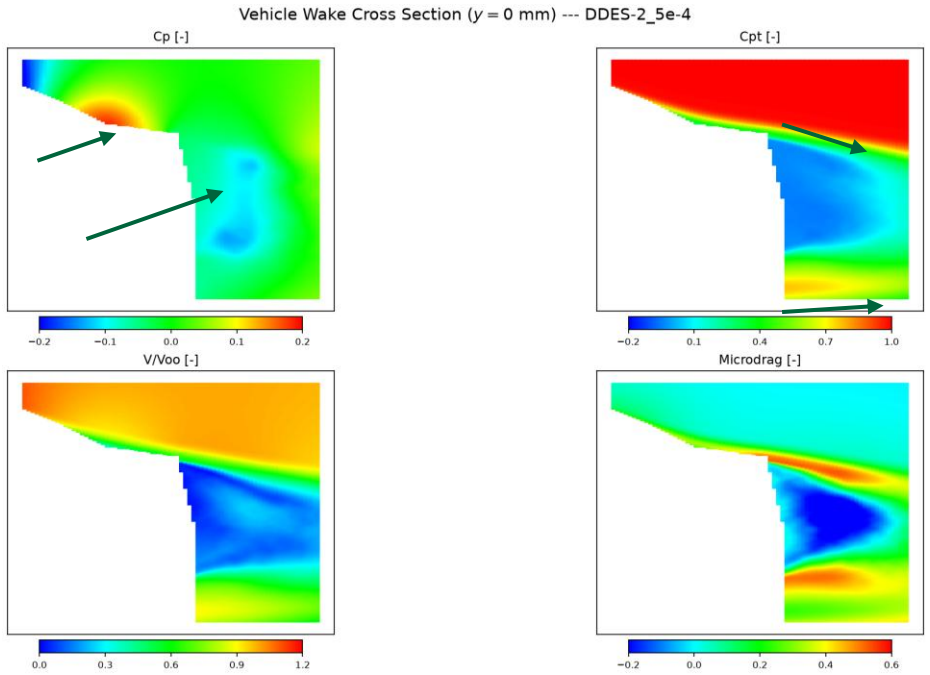


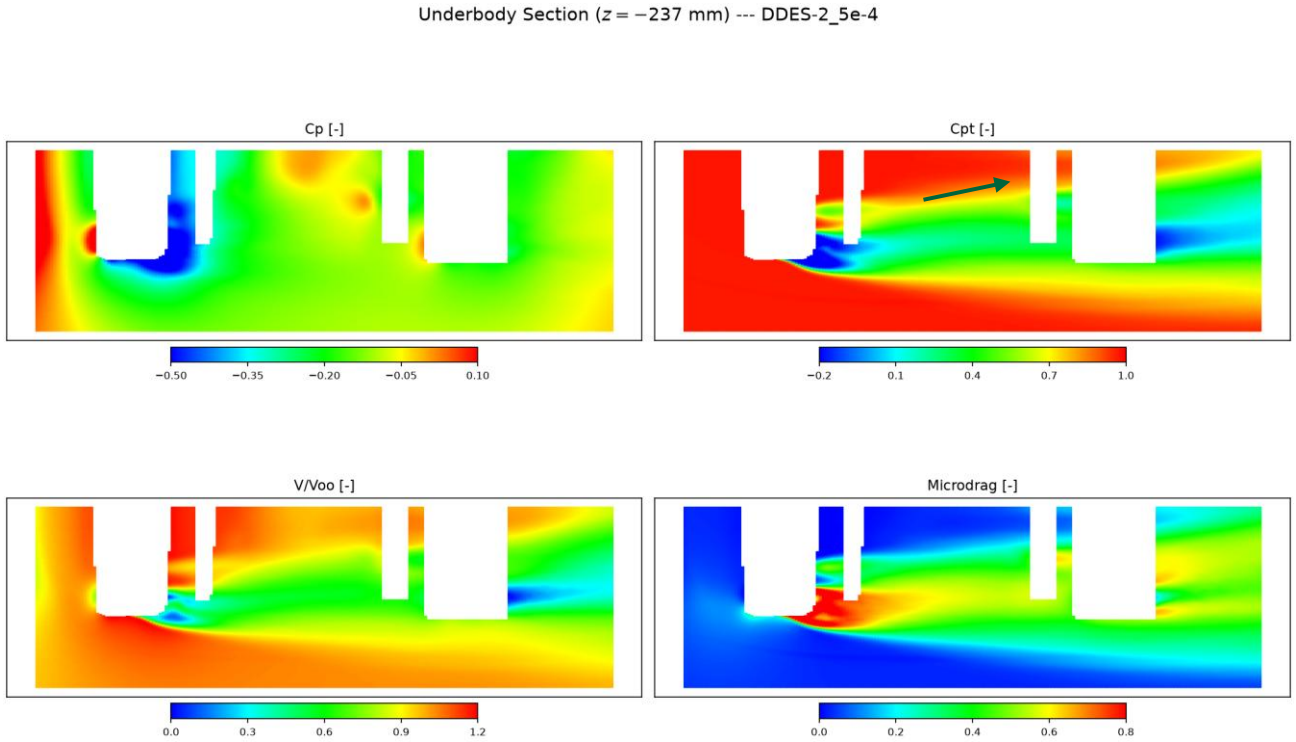
No Low dissipation scheme





Low dissipation scheme

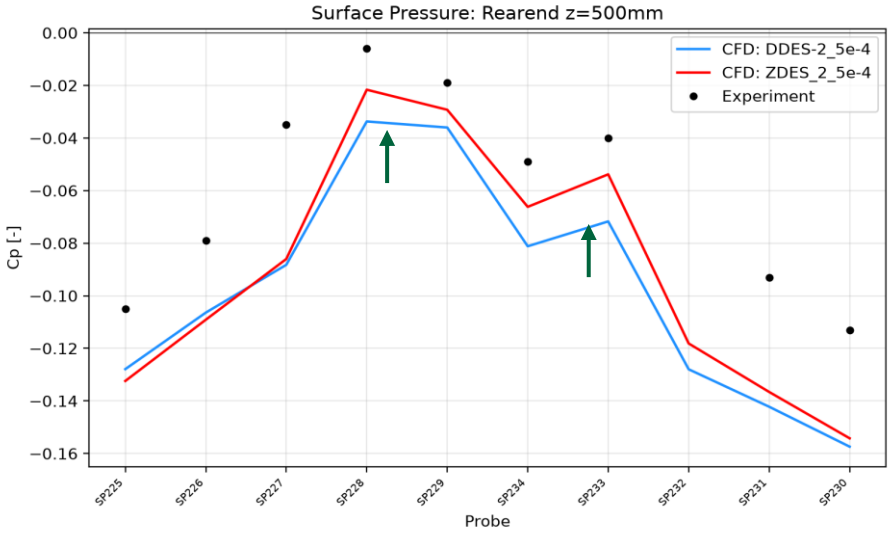




- More pronounced downwash of the rear wake
- The low CpT bubble is extended
- FWW more expanded in the underfloor

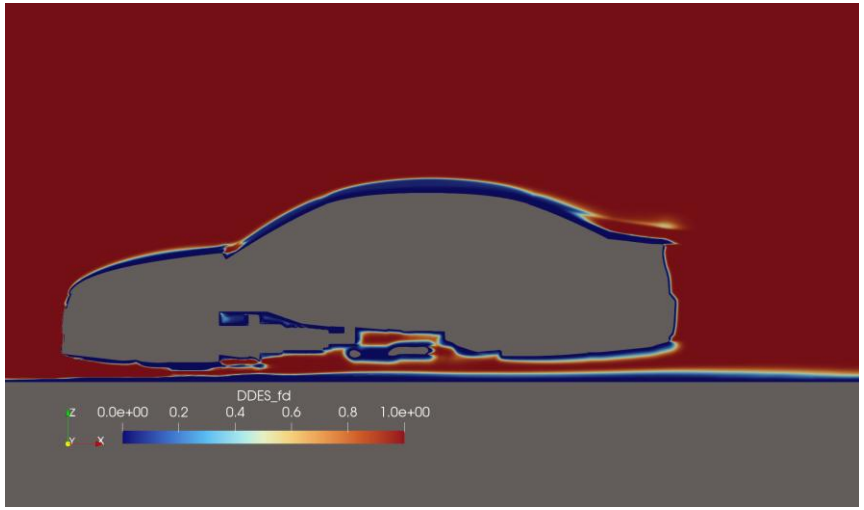
Shielding Function

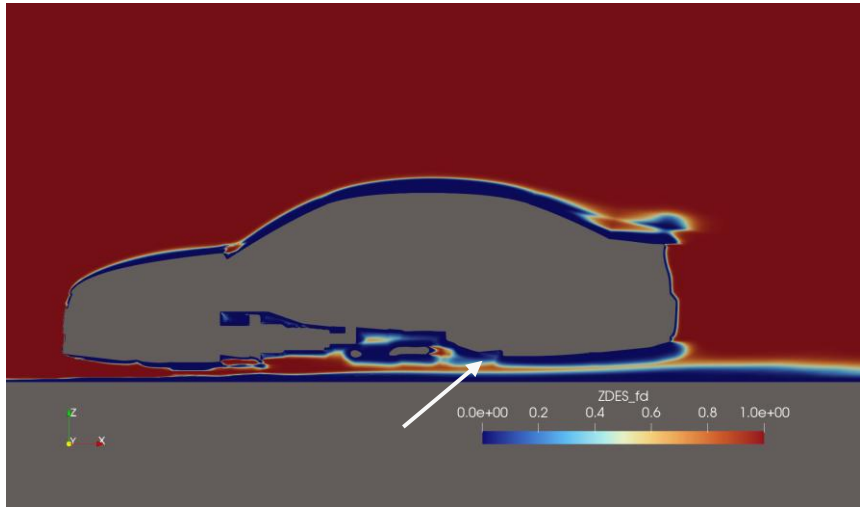
- DDES is compared to ZDES with Deck Renard shielding function
- Overall very similar behaviour
- Slightly better at the rear



CD DDES =0.2601 (+5.5cts)

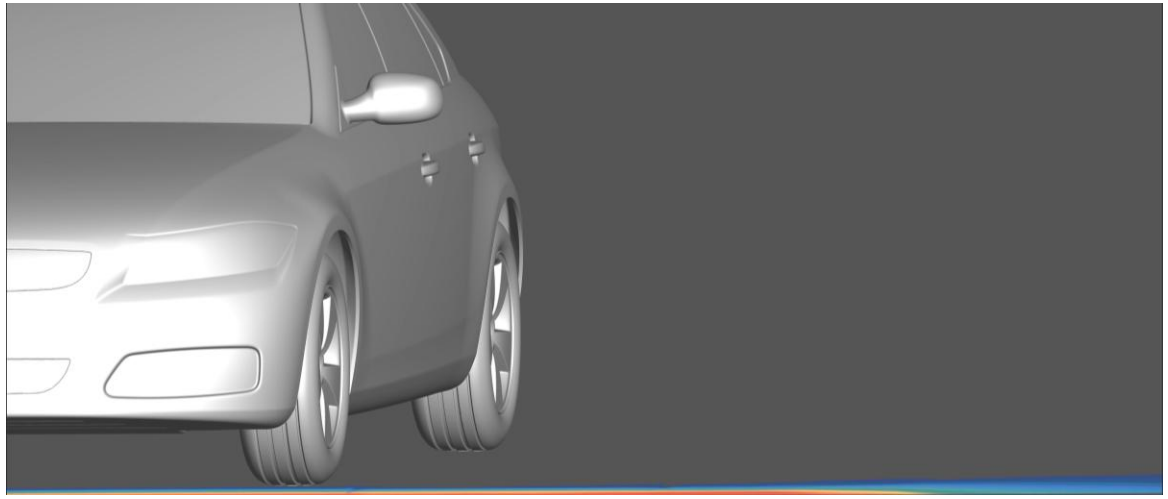
CD ZDES =0.2493 (-5.3cts)

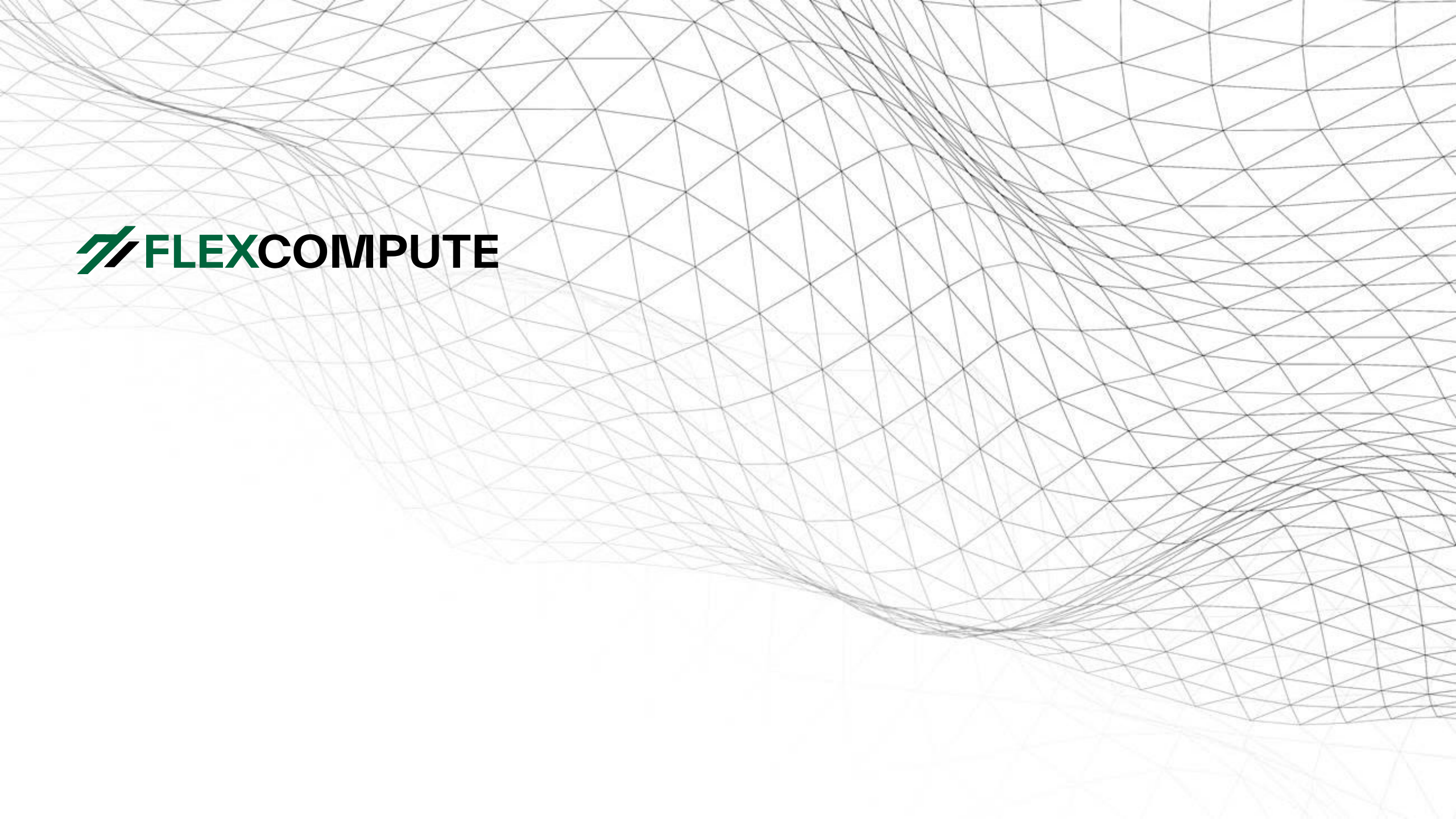




Conclusions

- Meshed with GeometryAI, proven to be **accurate** and **robust**
- The complete mesh + ExtrafineDDES took ~ **6hrs**
- Good agreement on surface probes
- Trends and especially geometrical delta can be captured with a coarser Dt (1e-3s)
- Finer dt (2.5e-4) gave extra accuracy
- Low dissipation scheme is an improvement to capture correctly wake structures




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