JBC Test Data 2

Data from Osaka University (OU) and Hamburg University of Technology (TUHH)

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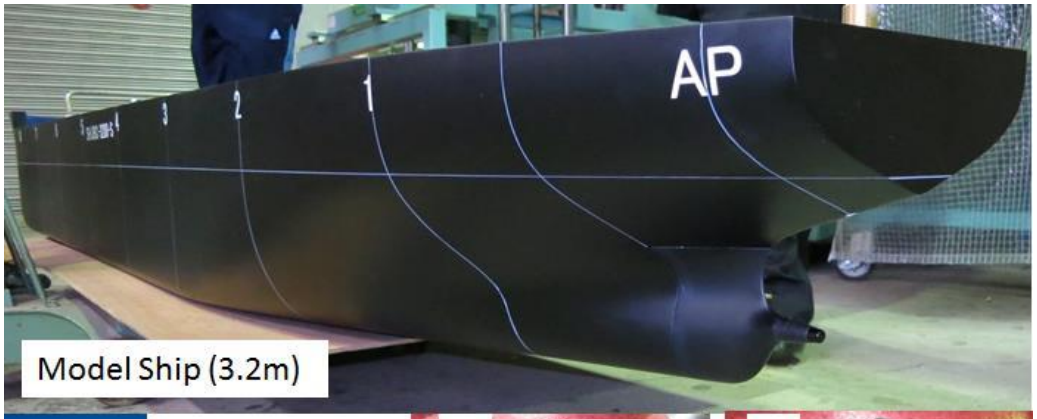
Presented byTakanori Hino, YNU

Osaka University Towing Tank

length=100m, width=8.0m, water depth=4.35m
Carriage speed 0.01 – 3.5 m/s



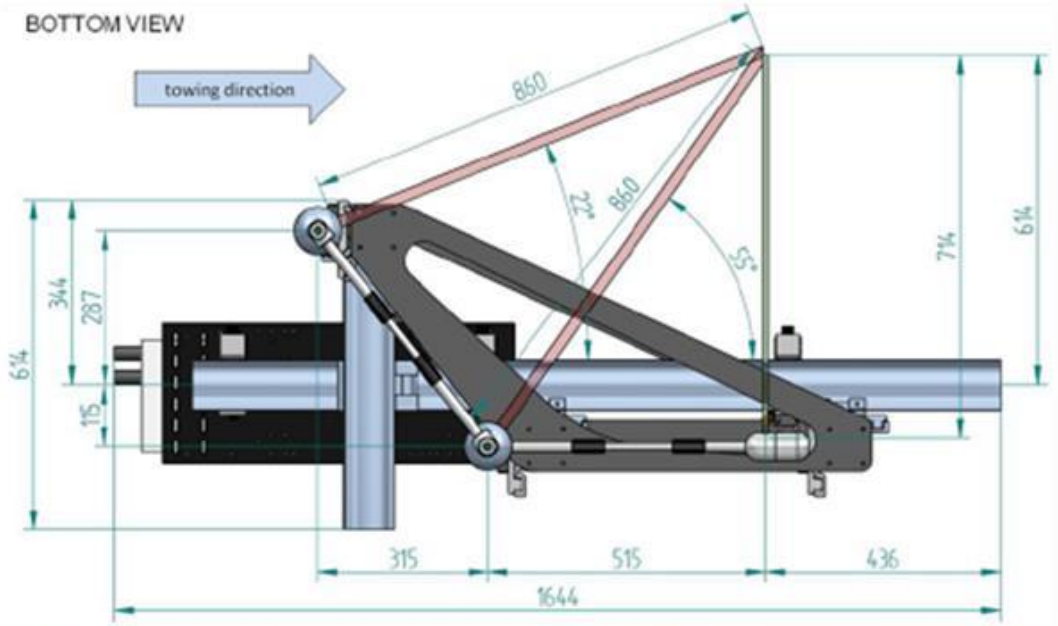
OU model(3.20m) for Towing Tank

Principal Particulars of Model Ship

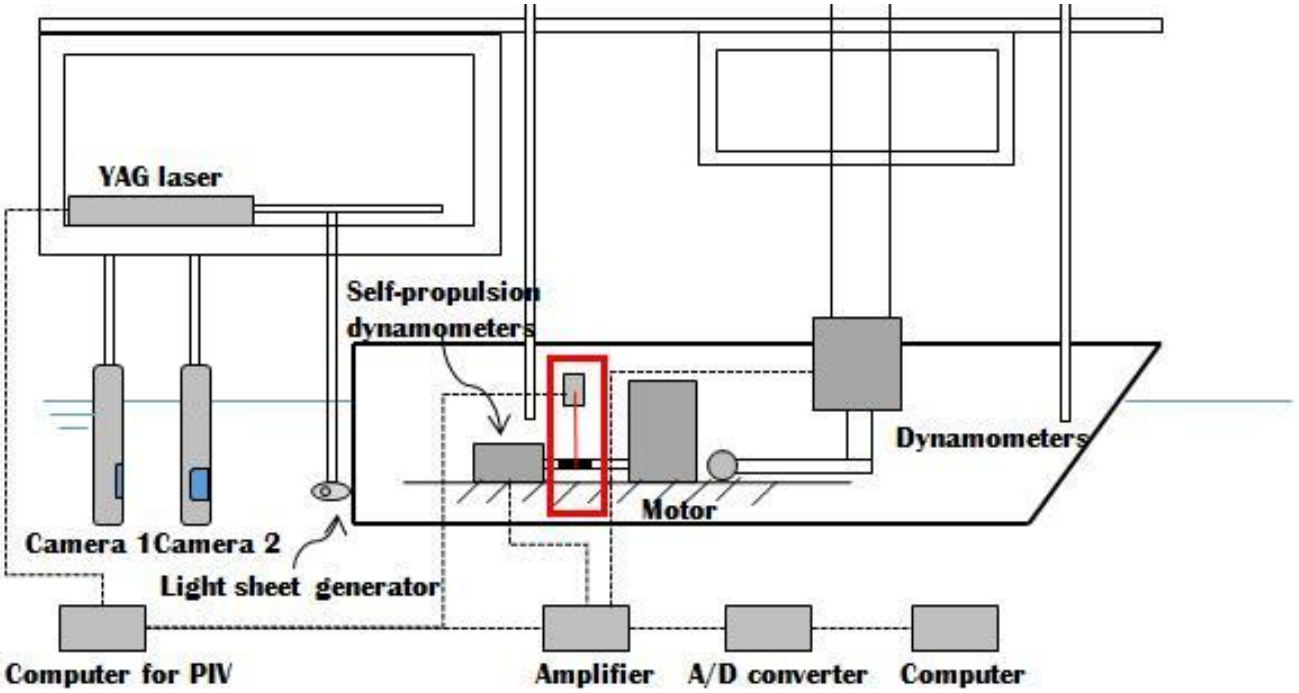
Lpp (m)	3.2
Bwl (m)	0.5143
D (m)	0.2857
d (m)	0.1886

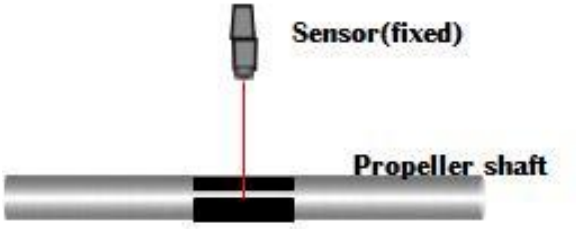
Principal Particulars of Model Propeller

Dp (m)	0.0928
P/D	0.75
Section	AU
Z	5


BOTTOM VIEW
towing direction
860
22°
860
55°
714
614
614
344
287
115
315
515
436
1644

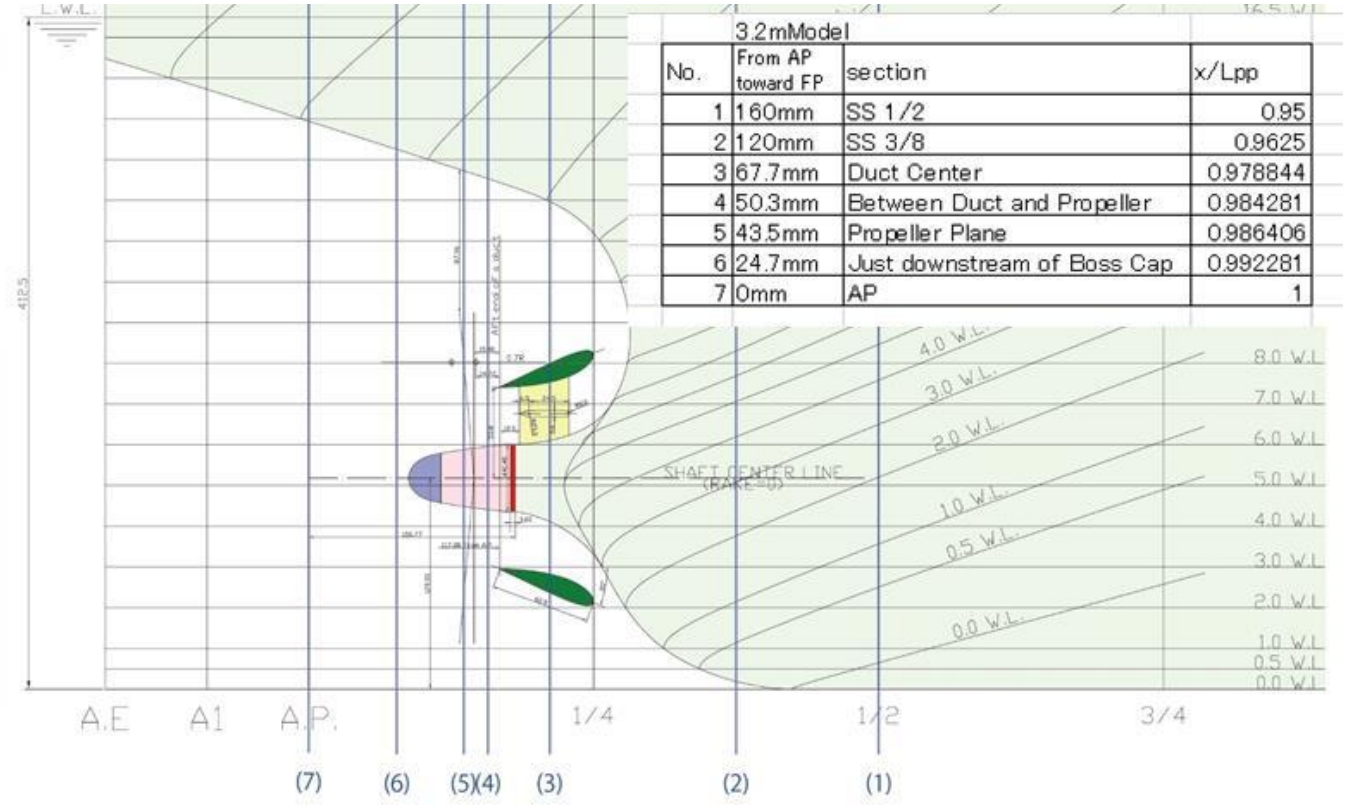
SPIV system

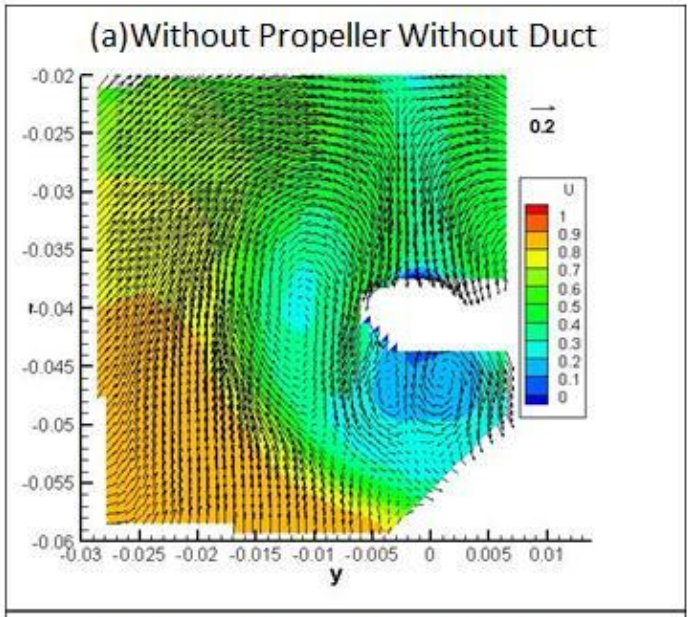


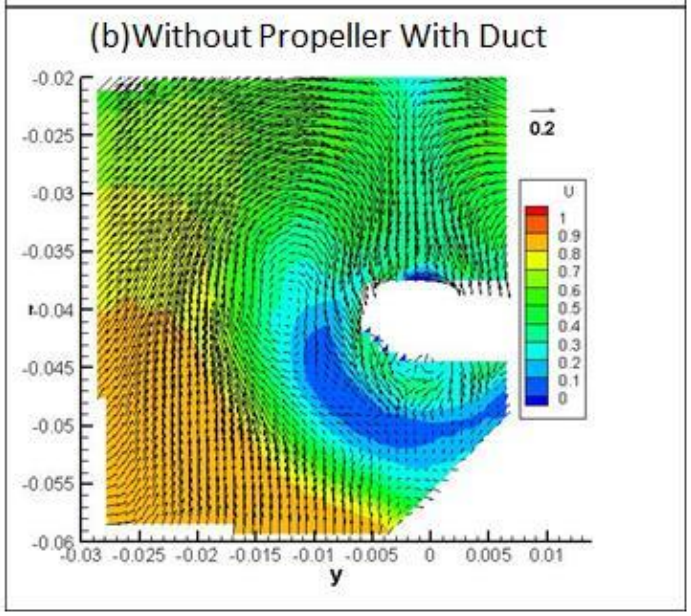


Phase Synchronizing system

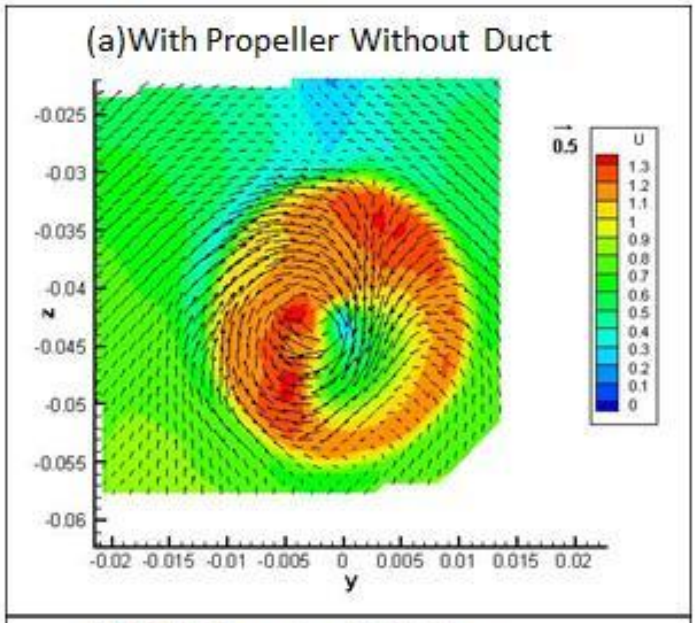
- Fn=0.142, Rn=2.17 x 10^6
- Resistance Test
- Self-Propulsion Test
- SPIV Measurement

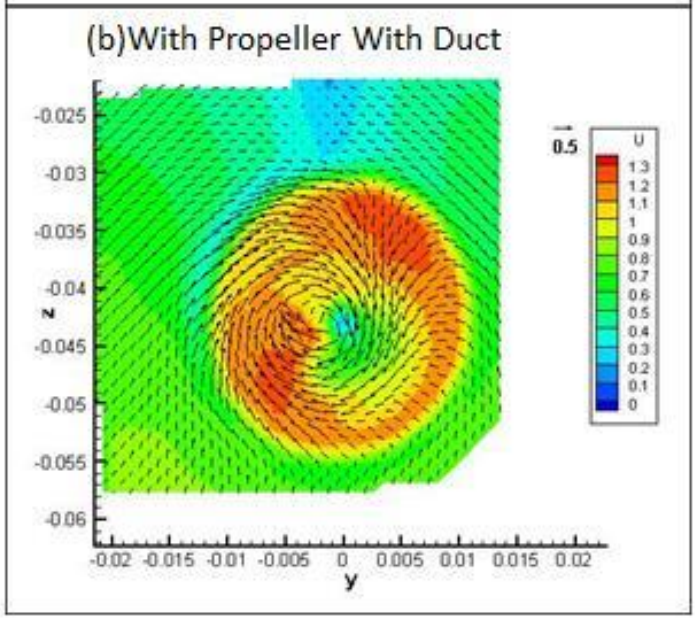




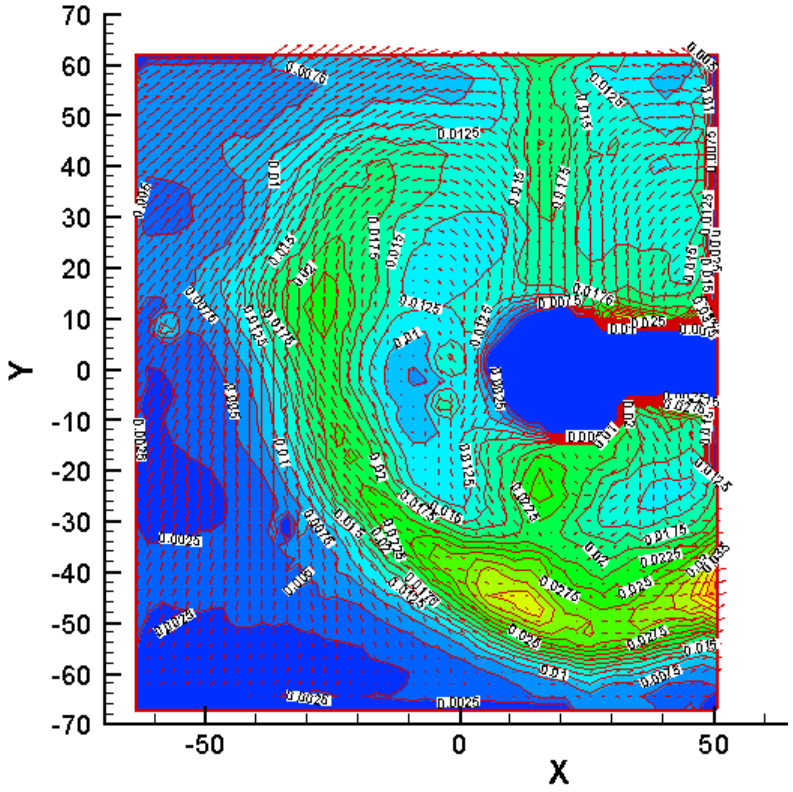


Velocity on a Propeller Plane
(w/p Propeller)

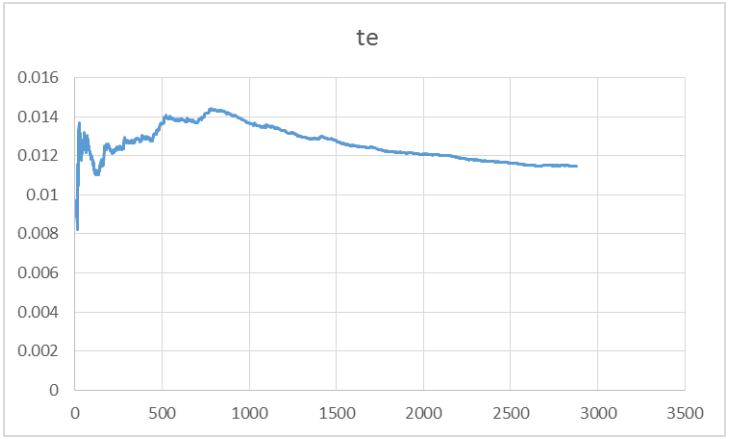




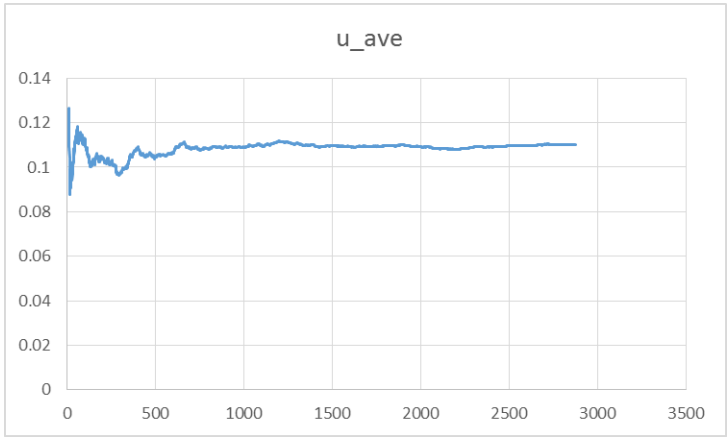
Velocity at *x/Lpp*=0.992
(w Propeller)



TKE and cross flow vectors

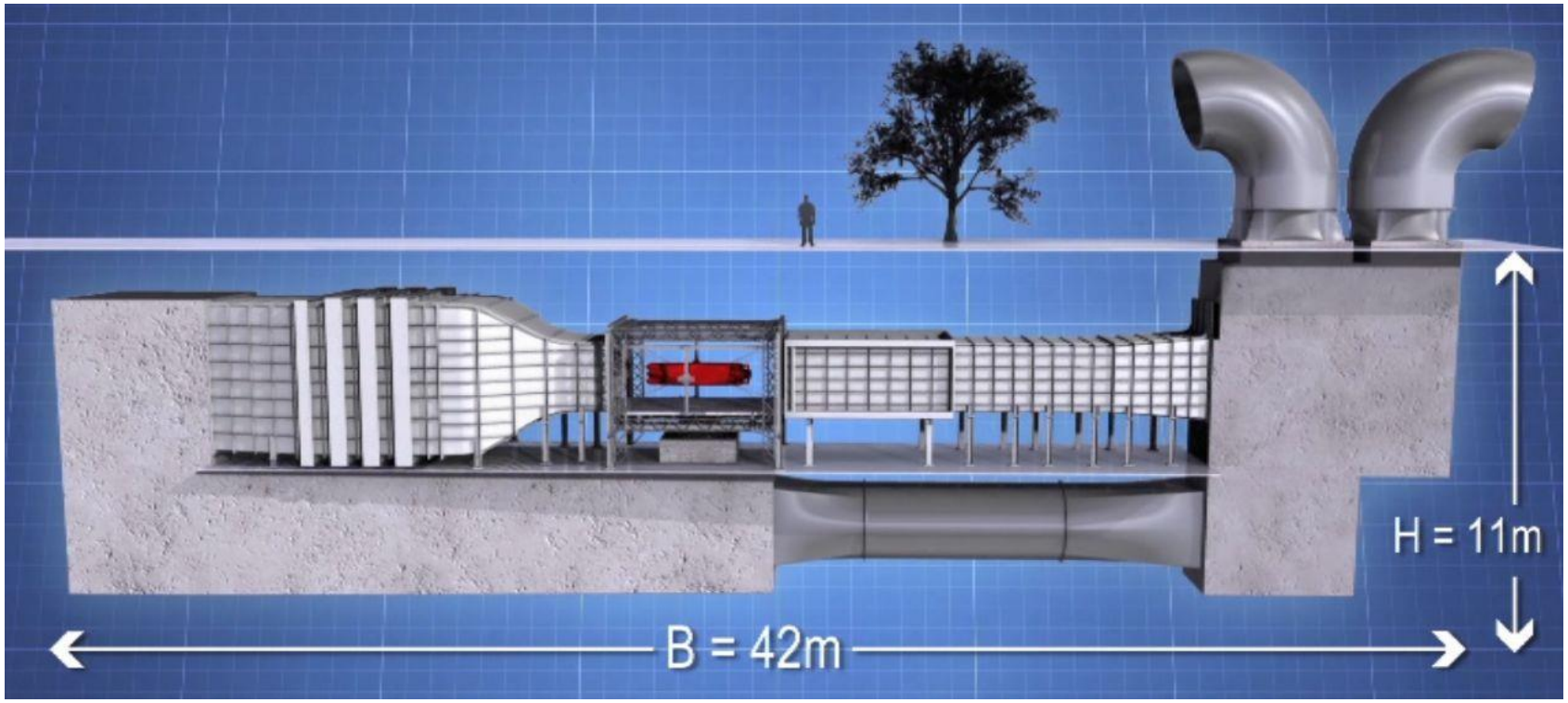


TKE convergence X=0.87,y=29.75



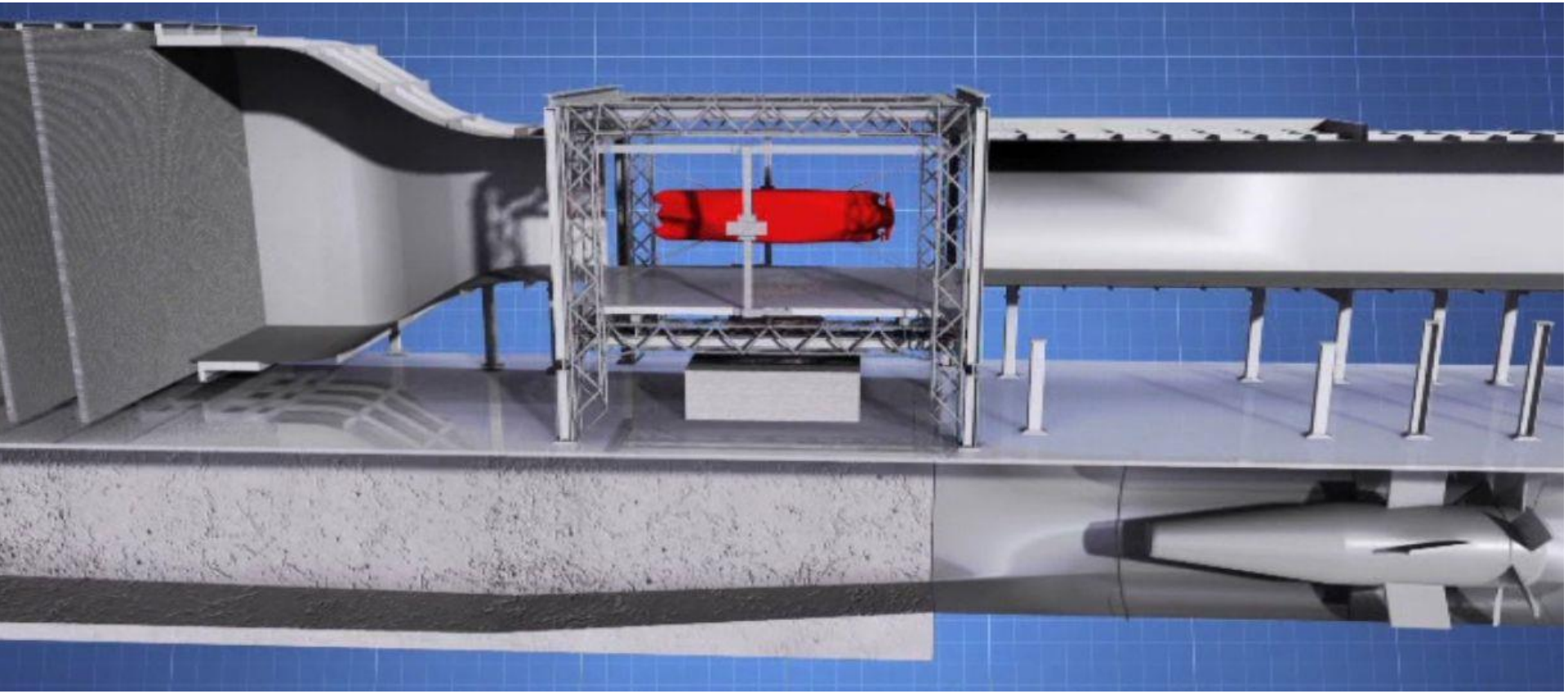
U_ave convergence X=0.87,y=29.75

TUHH Low - Speed Wind Tunnel



- **Max. wind speed: 40 m/s**
- **Turbulence degree: < 0.2%**
- **operational modes: closed circuit (Göttingen – mode)**
  open circuit (Eiffel – mode)

Low - Speed Wind Tunnel



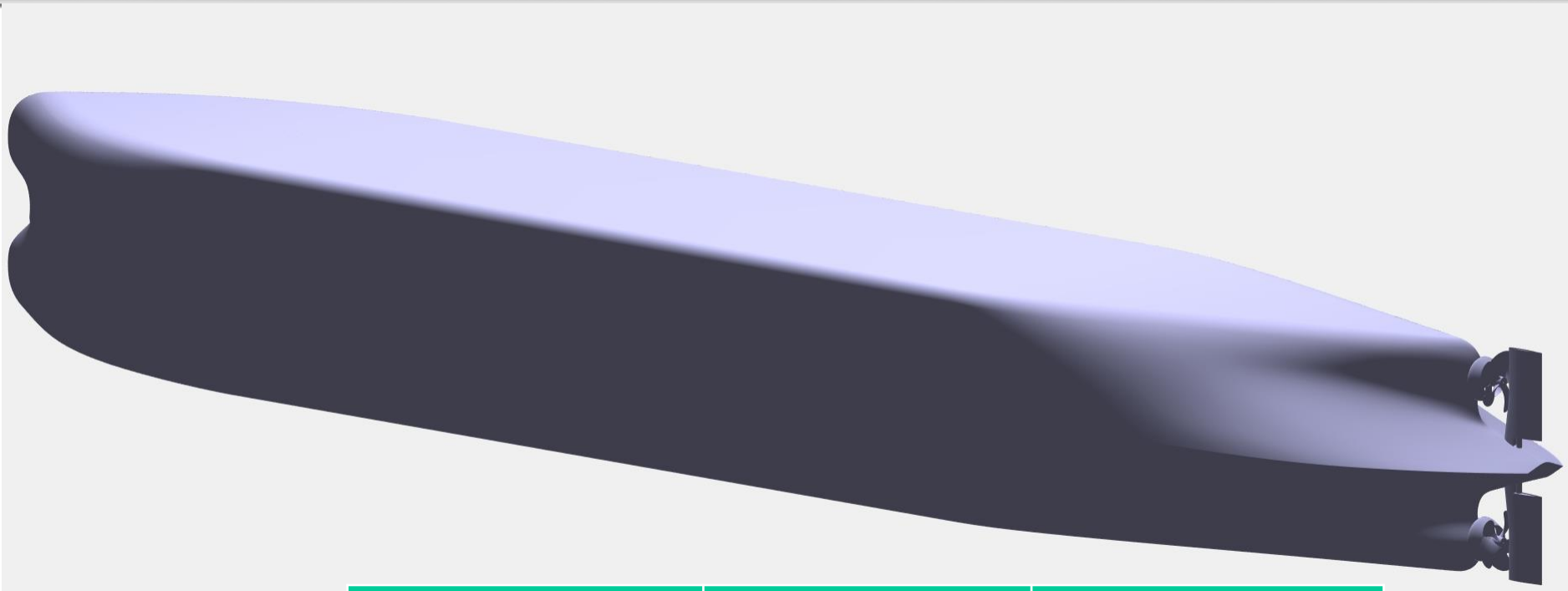
test section: L x B x D: 5.5m x 3m x 2m

techniques: stereoscopic PIV

1-D LDV, hot-wire / hot-film probes

integrated 6-component balance, pressure probes

Model: JBC – double hull model



	original	model
L_{pp}	280.00 m	3.513 m
B	45.17 m	0.567 m
D	16.61 m	0.208 m
c_B	0.848	0.848
model scale	1	79.704

Test configuration

Test conditions

U_∞ = 11.8 ms^{-1}
n_{Prop} = 7250 min^{-1}
α = 0°
$Re_{(Lpp)}$ = 2.74*10^6
turbulence stimulator (zig-zag-stripes)

- LDV-system is mounted on a crossbar
  (2D automated positioning)
  - accuracy of positioning: 0.2 mm
- sections for LDV measurements

section	description
SS 3/8	upstream before duct
SS 5/51	middle of the gap between propeller and duct
AP	aft perpendicular

- geometry variations
  A) without duct, without propeller, without rudder
  B) without duct, with propeller, without rudder
  C) with duct, without propeller, without rudder
  D) with duct, with propeller, without rudder

- preliminary investigation on

  - blockage (to find an optimal position of the model in the wind tunnel test section)

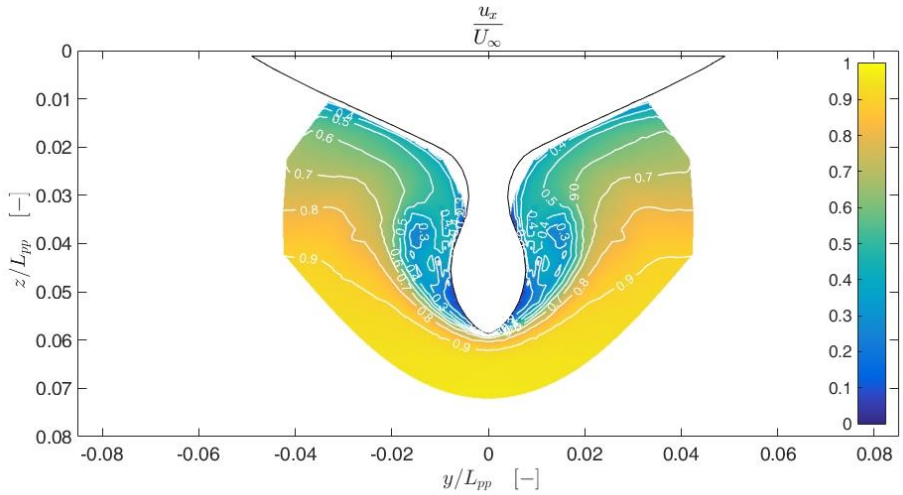
  - turbulence stimulation, viscous resistance (to find the right measure of turbulence stimulation compared with resistance measurements in a towing tank)

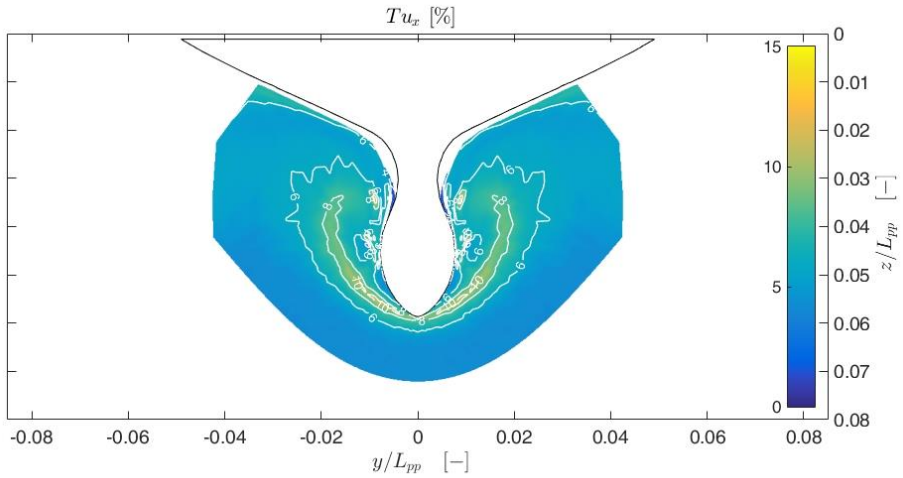
  - correction of statistical parameters by the influence of truncated normal distributions (LDV filtering)

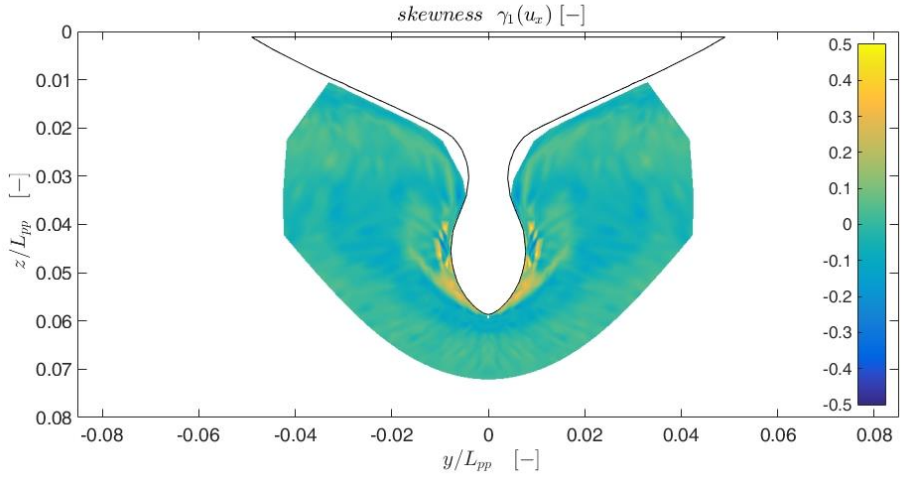
  - definition of an optimized selection of LDV - measuring points by conformal mapping method

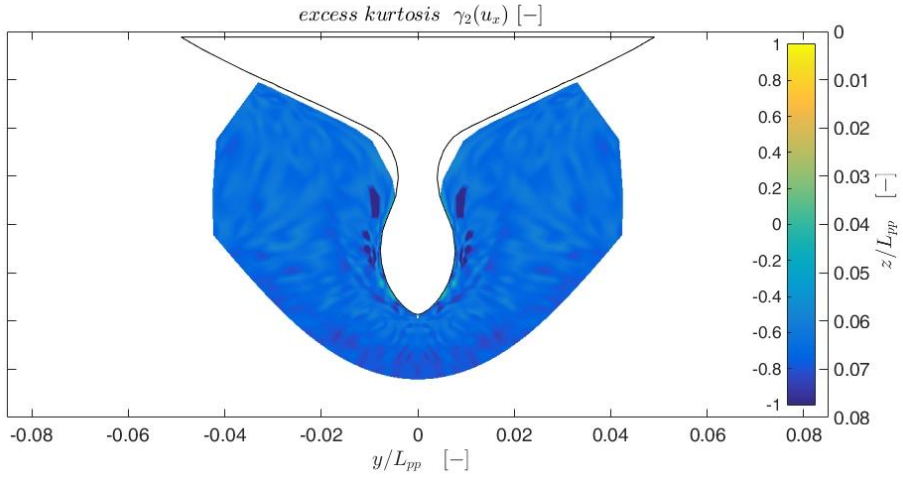
Results – configuration A

- **section 3/8**



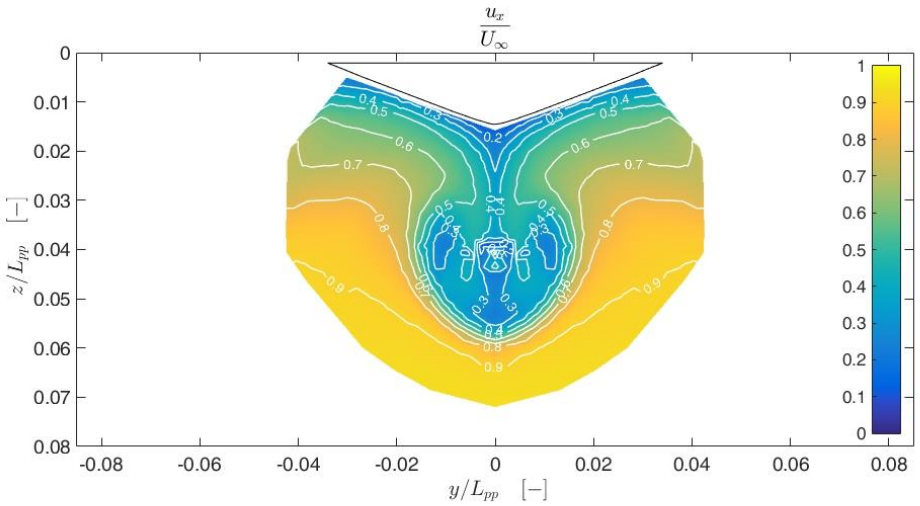


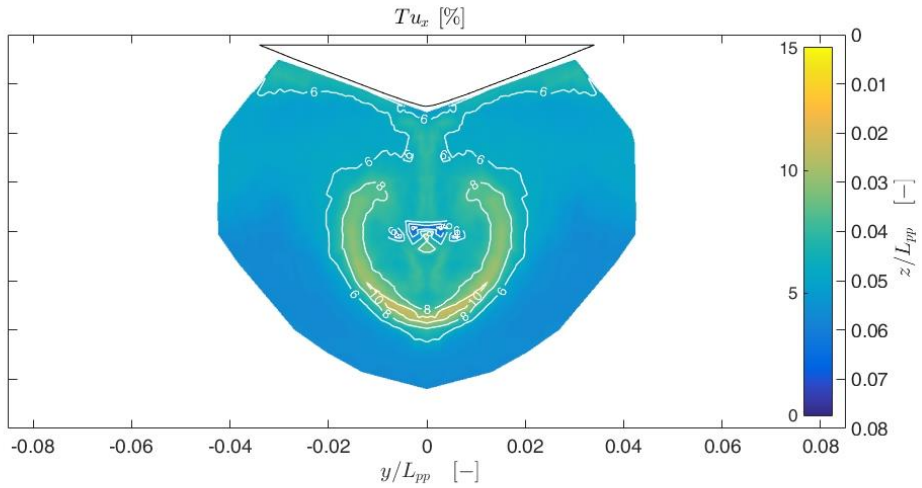


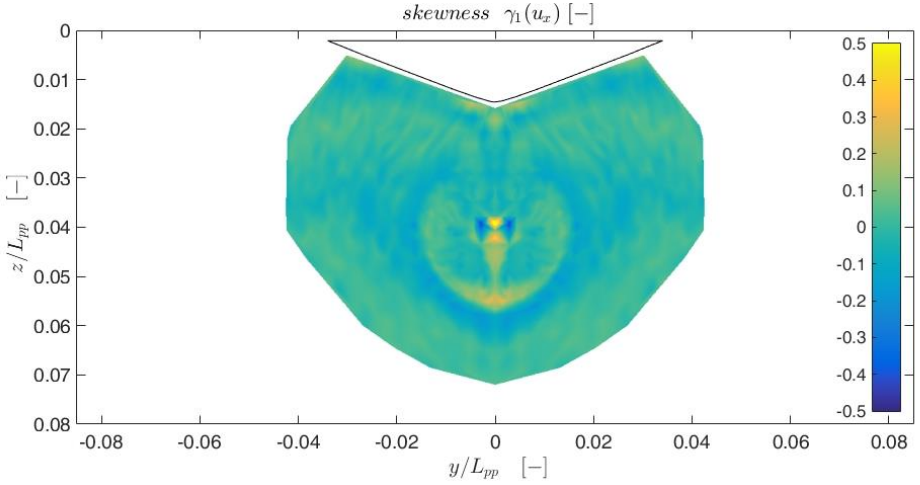


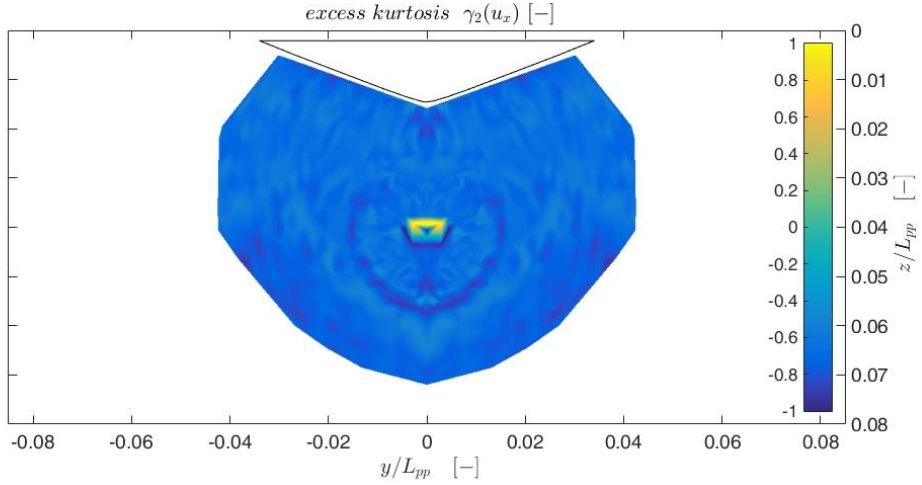
Results – configuration A

- **section 5/51**



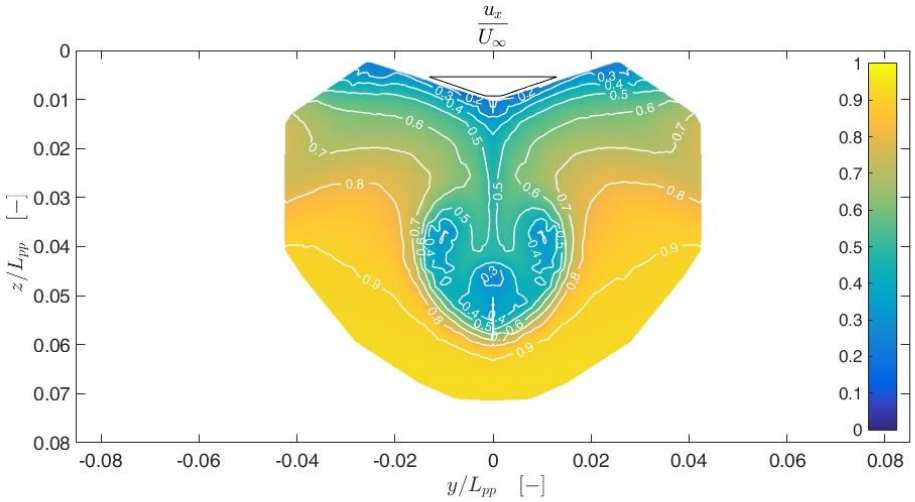


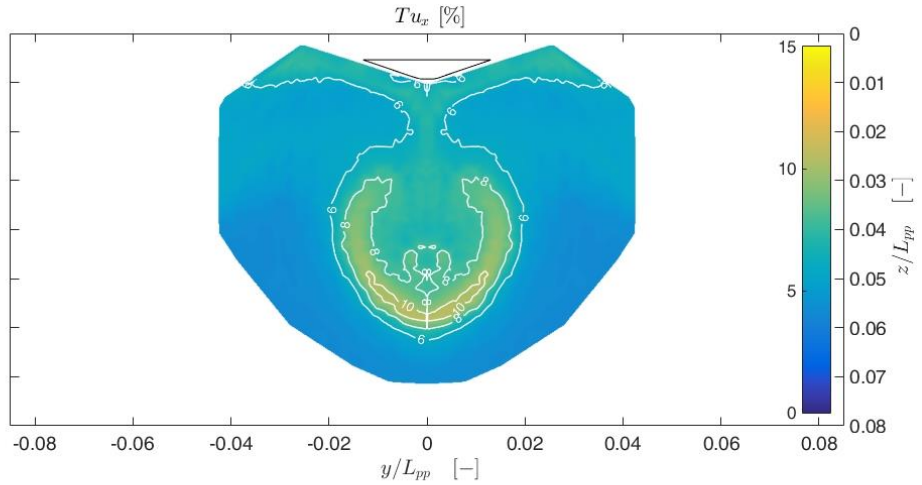


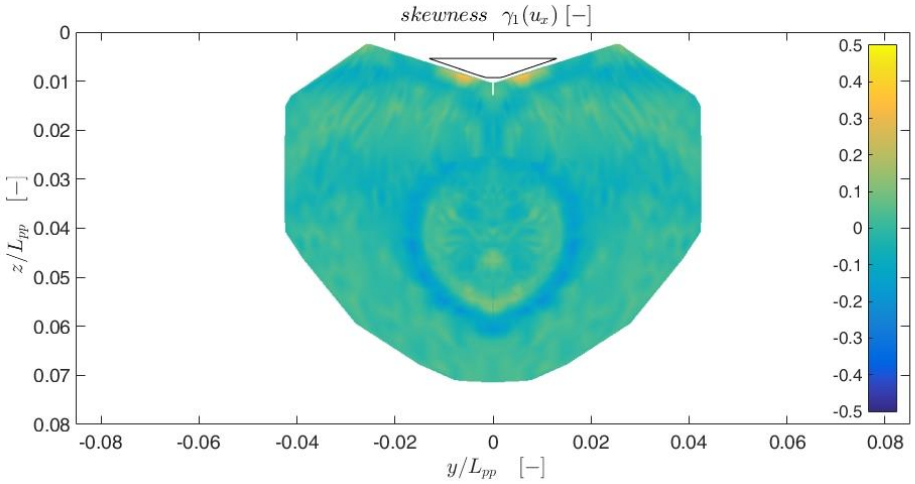


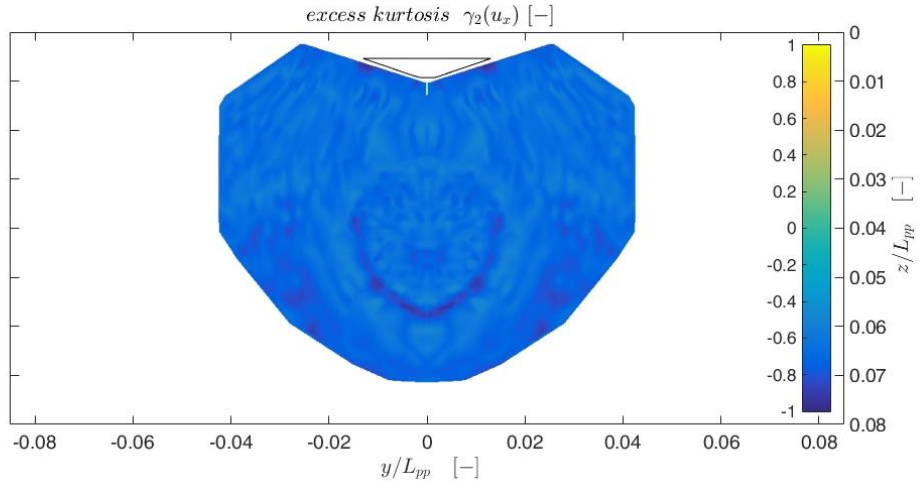
Results – configuration A

- **section AP**

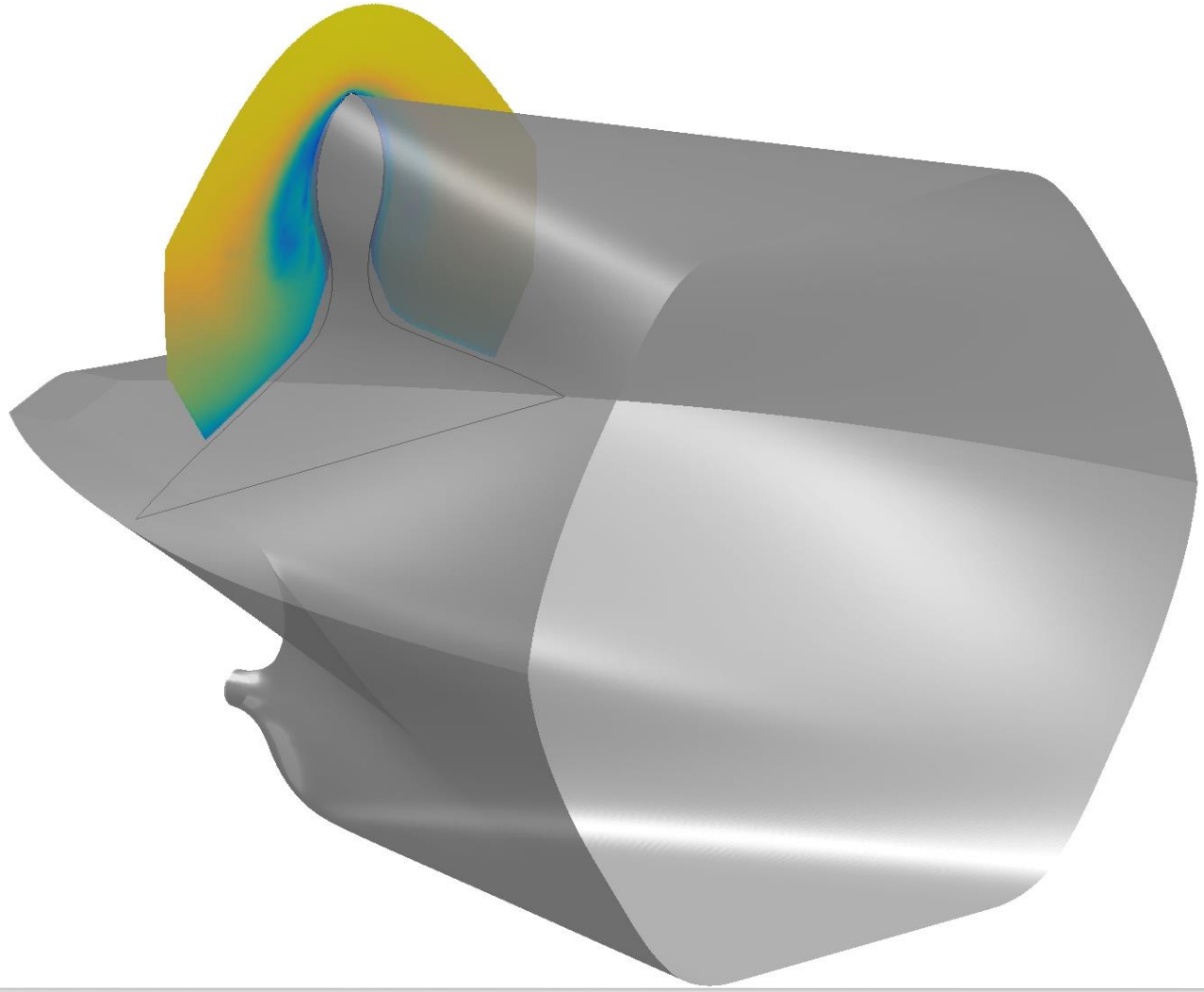






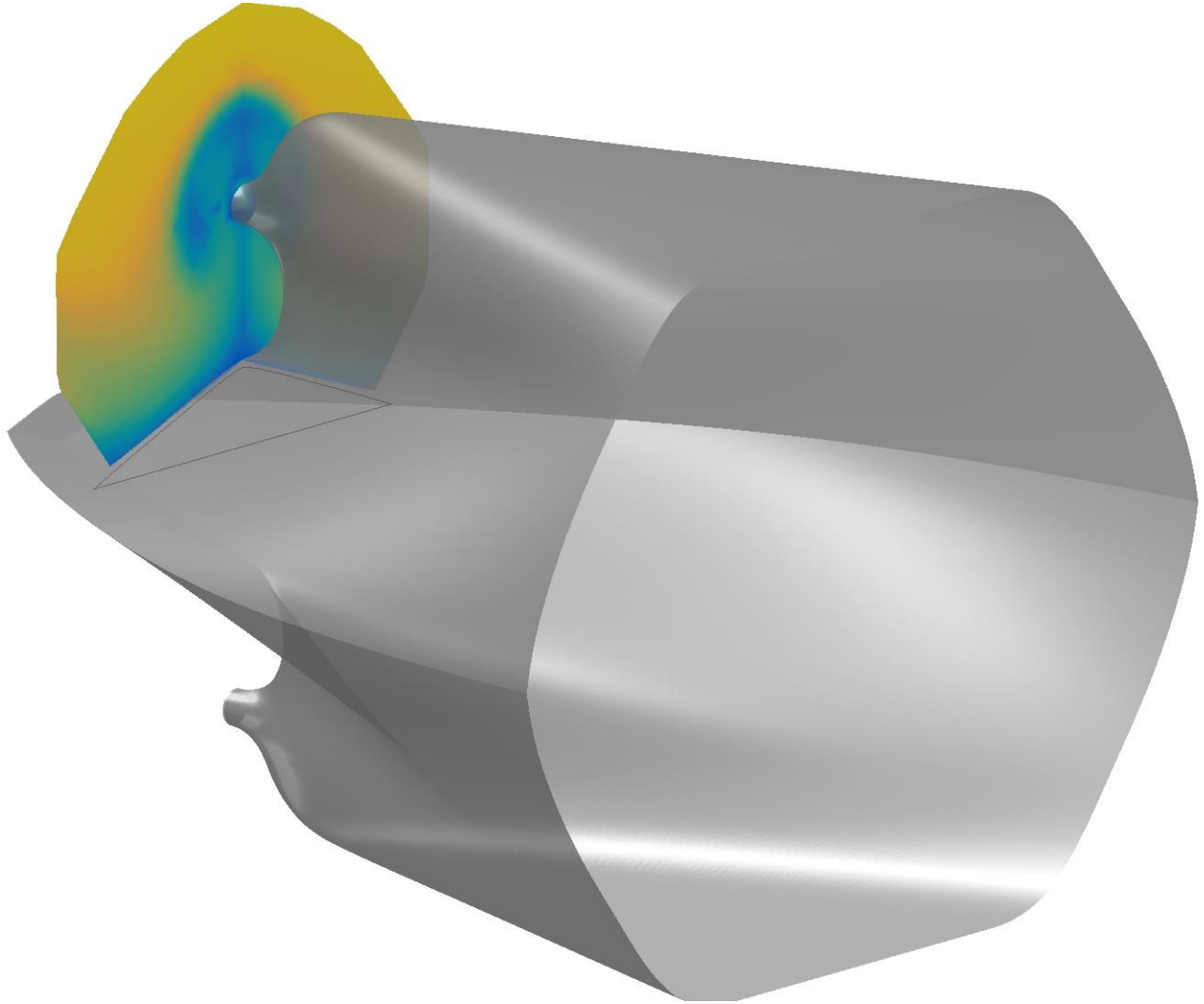


- section 3/8 (u_x / U_{oo})



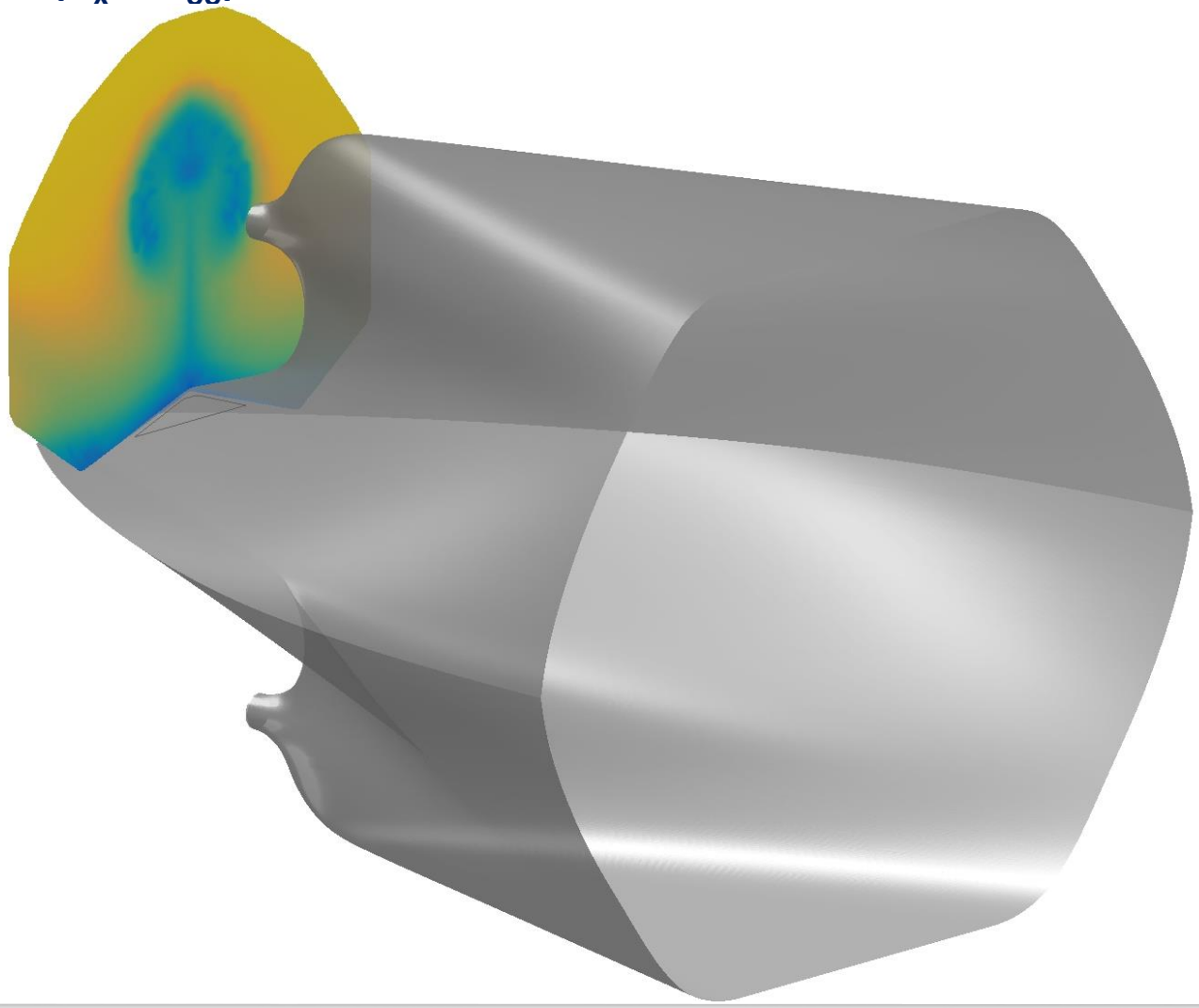
Results – configuration A

- section 5/51 (u_x / U_{oo})



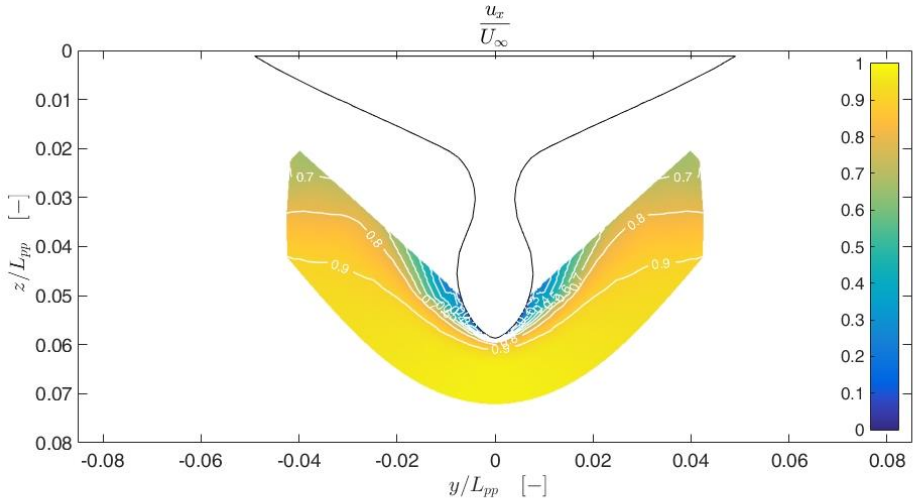
Results – configuration A

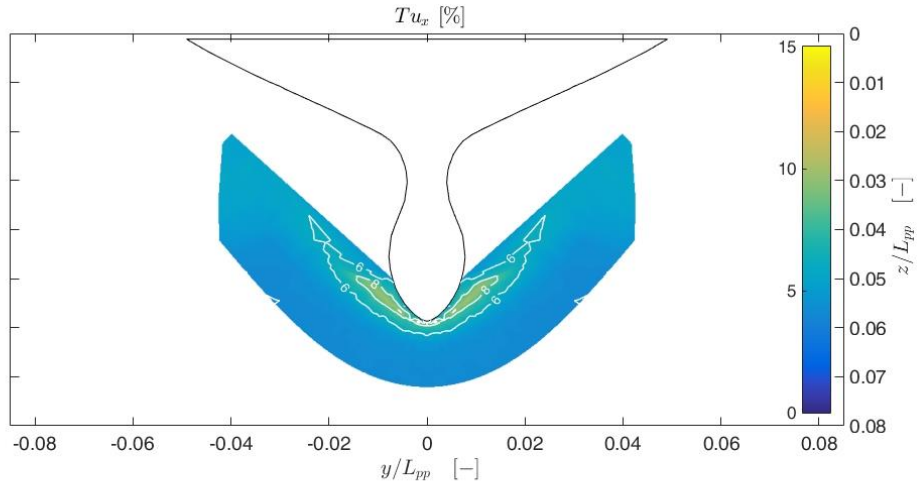
- section AP (u_x / U_{oo})

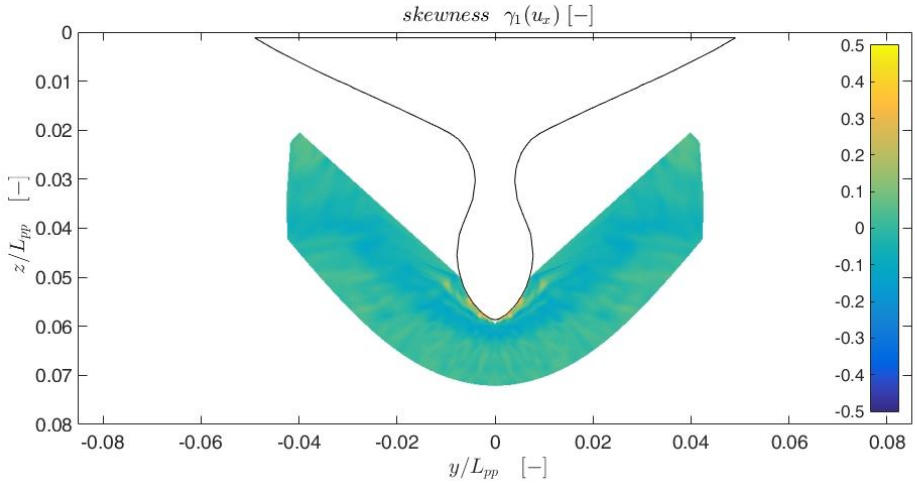


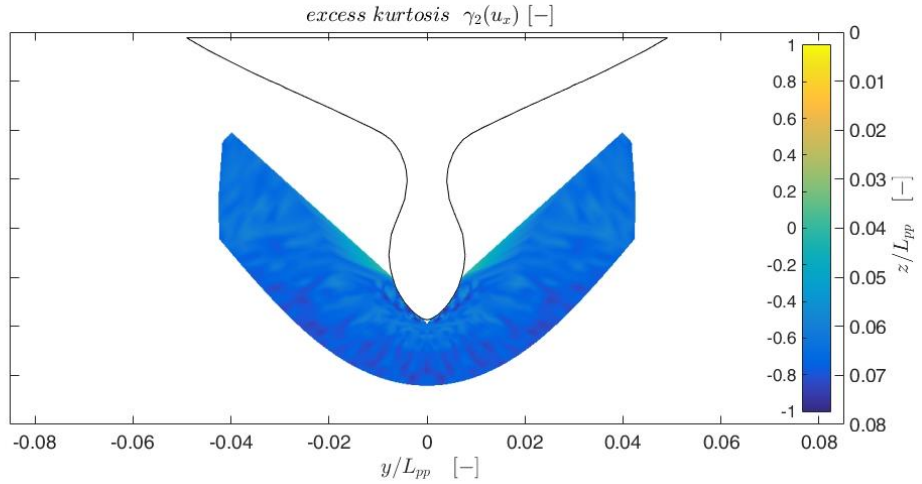
Results – configuration B

- **section 3/8 (ongoing measurements)**



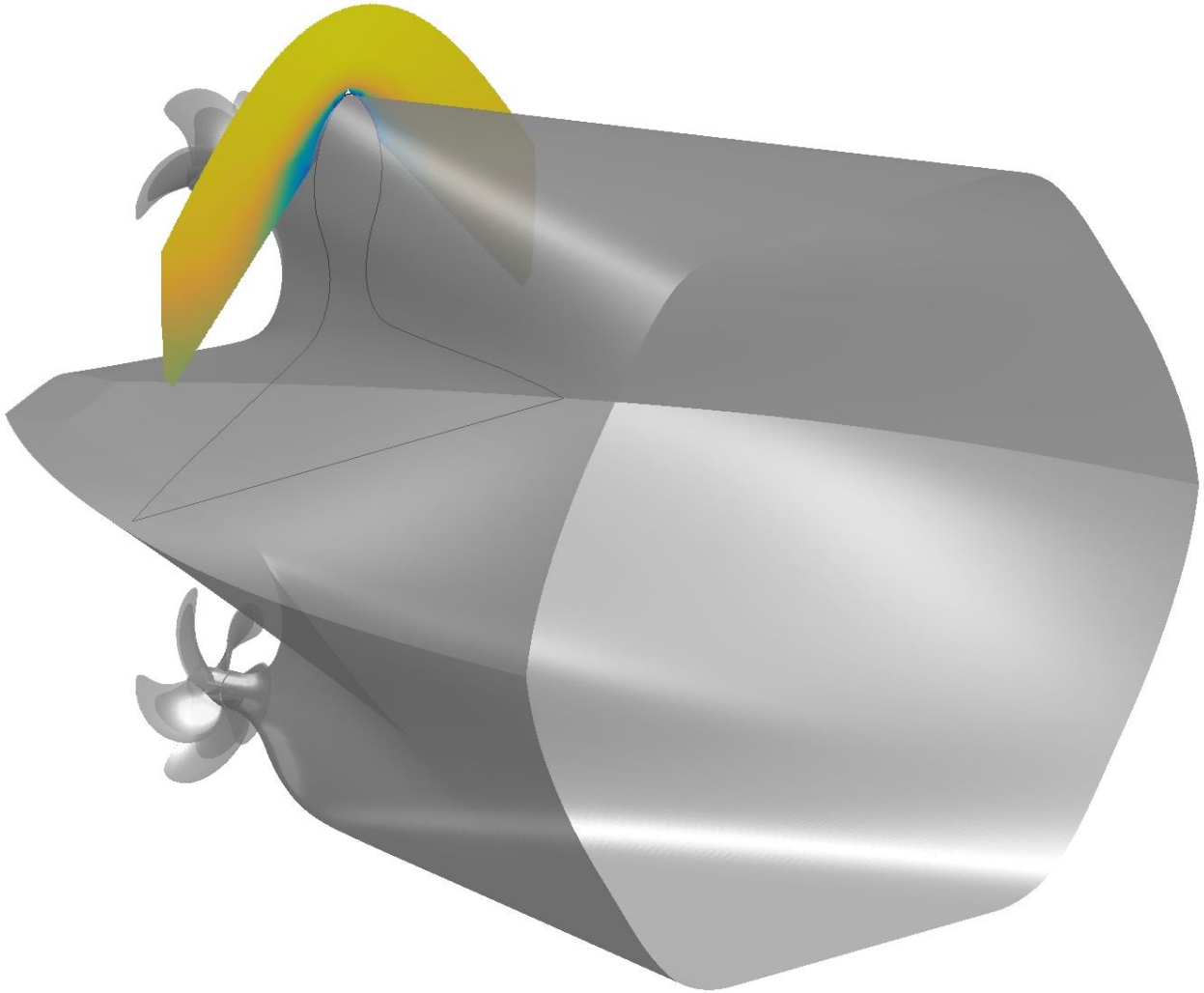




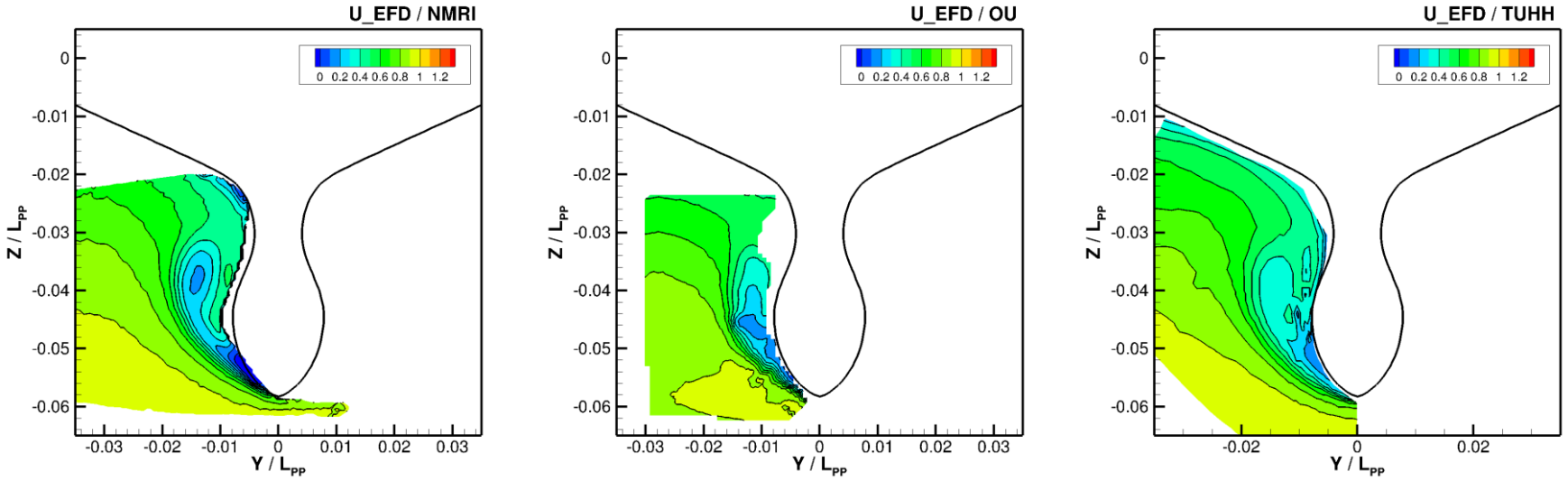


Results – configuration B

- section 3/8 (u_x / U_{oo}) (ongoing measurements)



Data Comparison 1

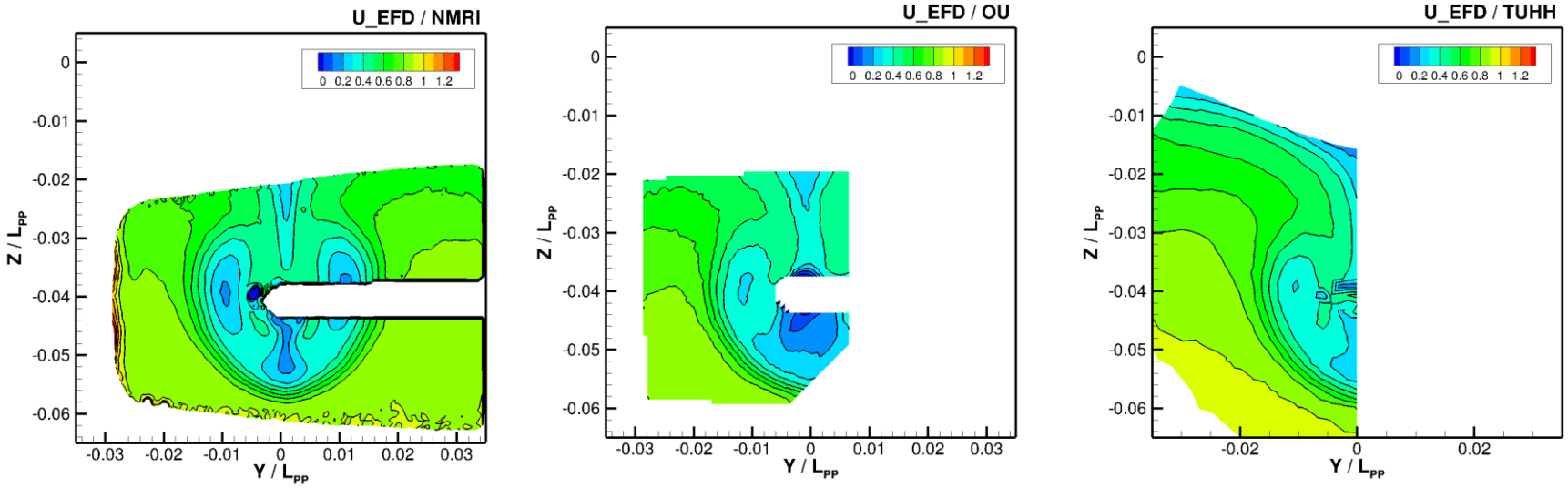


U on S2 (S.S. 3/8)

left:NMRI(Rn=7.46e6) center:OU(Rn=2.17e6)

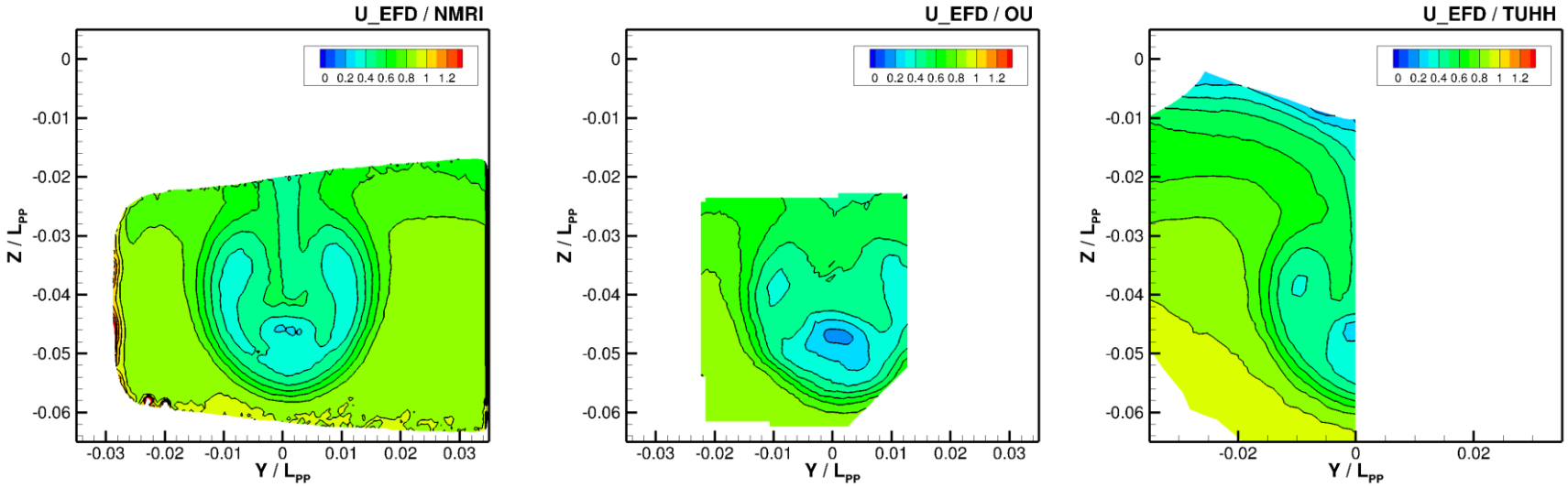
right:TUHH(Rn=2.74e6)

Data Comparison 2



U on S4 (Betw'n Duct and Prop.)
left:NMRI(Rn=7.46e6) center:OU(Rn=2.17e6)
right:TUHH(Rn=2.74e6)

Data Comparison 3



U on S7 (A.P.)

left:NMRI(Rn=7.46e6) center:OU(Rn=2.17e6)

right:TUHH(Rn=2.74e6)

- TUHH Data is used in Case 1.3b
  (Mean Velocity woDuct WoProp)

- OU and TUHH Data will be used
  in the Post-Workshop Analysis