Potsdam Propeller Test Case (PPTC)
pressure distribution
Case 2.3

Ulf Barkmann

Potsdam Model Basin (SVA)

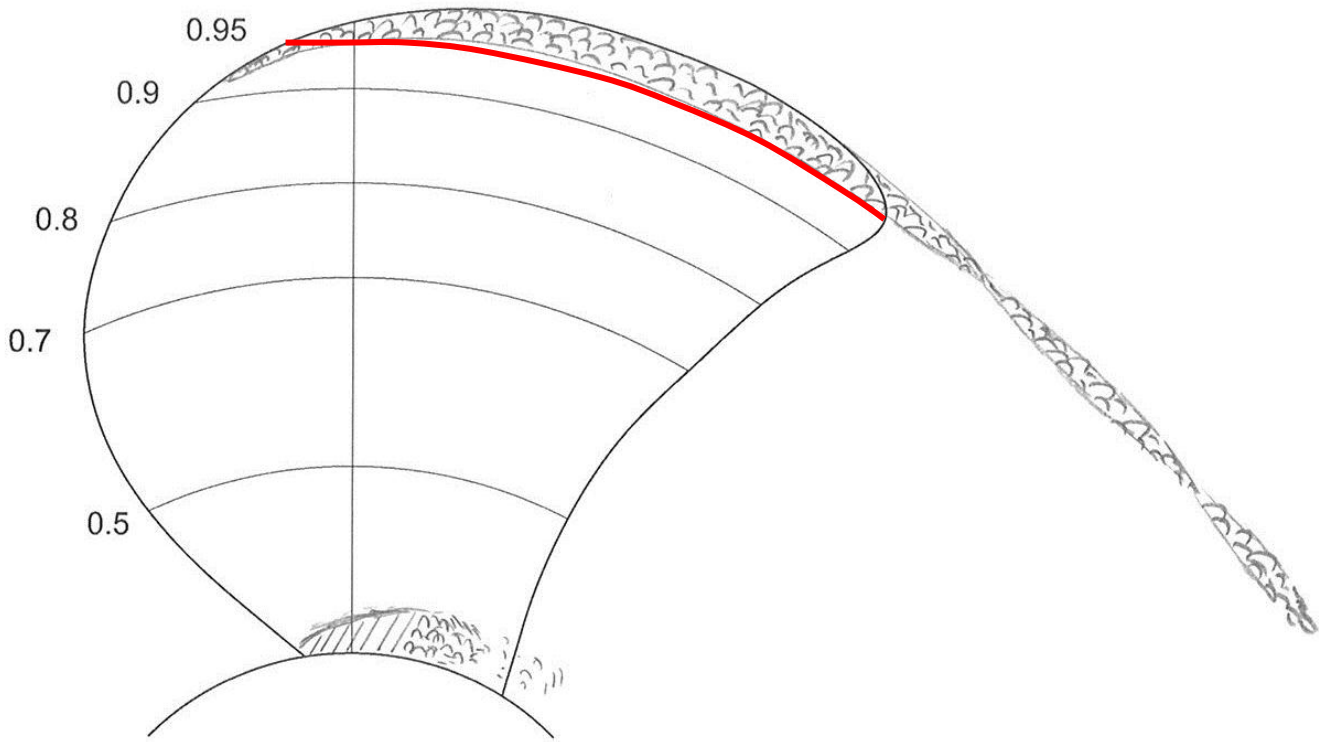
The Second International Symposium on Marine Propulsors 2011 – smp‘11

Participants

11 groups, 12 solvers, 15 calculations, about 250 curves

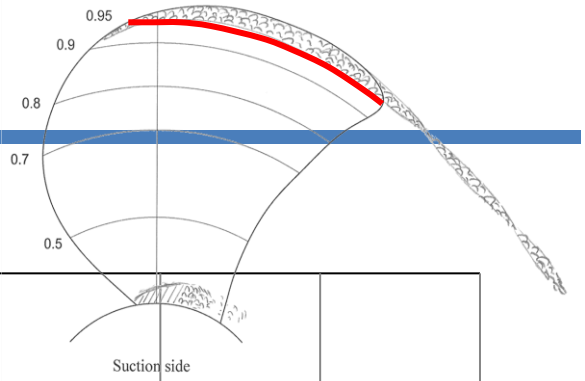
Group	Solver	Acronym
Berg-Propulsion	Procal	Berg-Procal
Cradle	SC/Tetra	Cradle-SC/Tetra
CSSRC	ANSYS Fluent	CSSRC-Fluent
HSVA	QCM	HSVA-QCM
	PPB	HSVA-PPB
INSEAN	PFC	INSEAN-PFC
SSPA	ANSYS Fluent	SSPA-Fluent
TUHH	FreSCO+	TUHH-FreSCO
University of Genua	Panel	UniGenua-Panel
	StarCCM+	UniGenua-StarCCM
University of Triest	ANSYS CFX(FCM)	UniTriest-CFX(FCM)
	ANSYS CFX(Kunz)	UniTriest-CFX(Kunz)
	ANSYS CFX(Zwart)	UniTriest-CFX(Zwart)
VOITH	Comet	VOITH-Comet
VTT	FinFlo	VTT-FinFlo

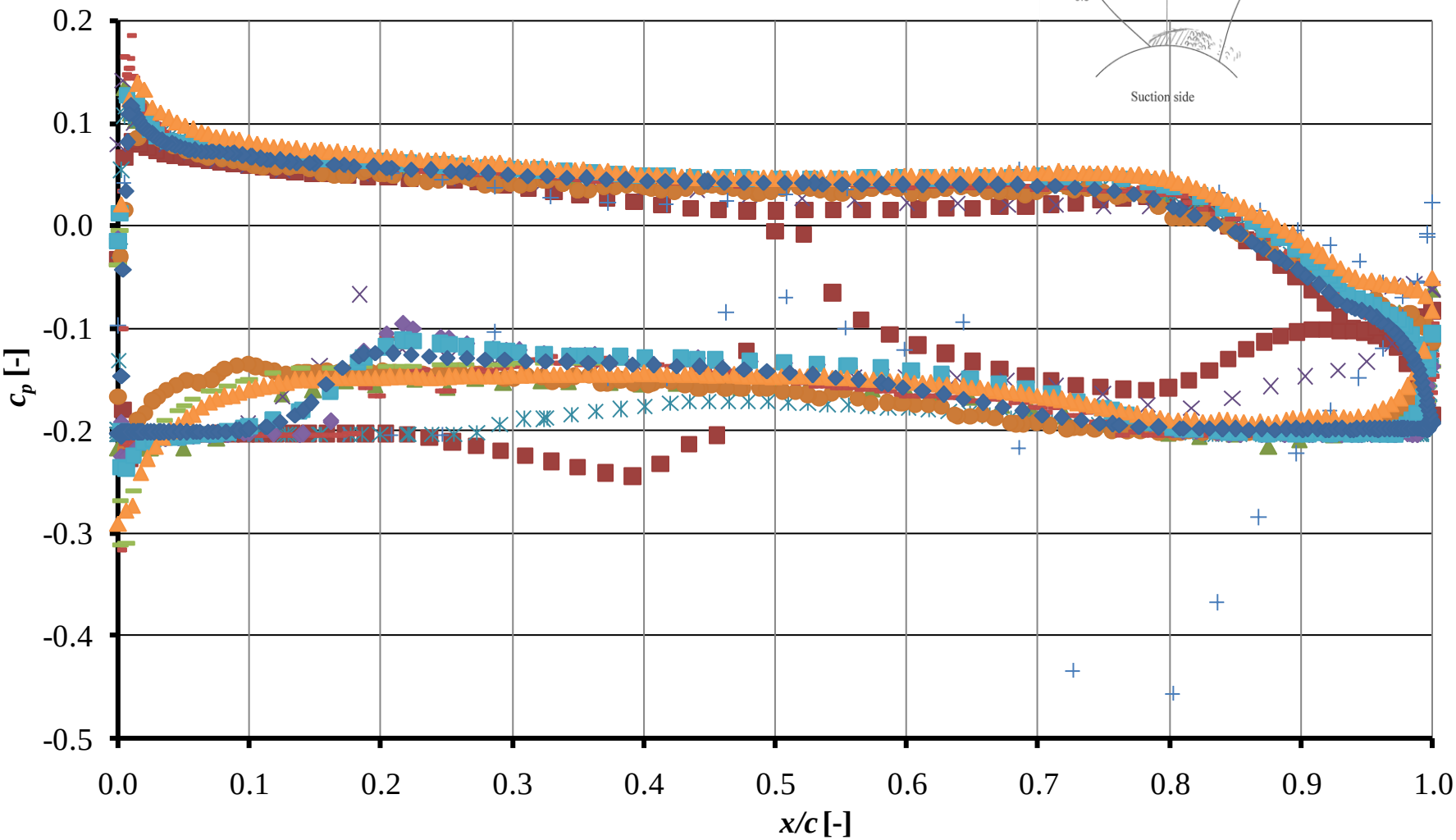
Case 2.3.1



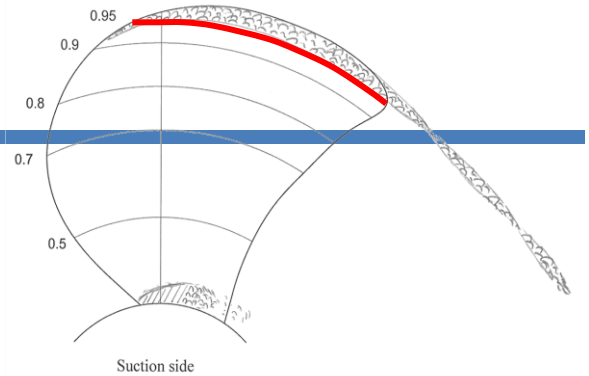
Advanced coefficient	J	[-]	1.019
Cavitation number	σ_n	[-]	2.024
Air content	α/α_s	[%]	53.5

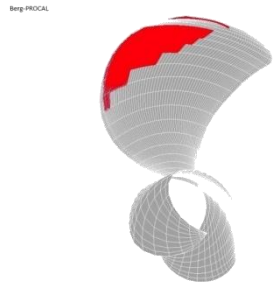
Case 2.3.1

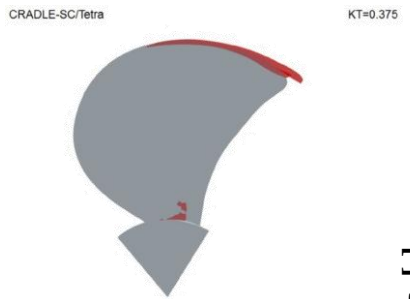

0.95
0.9
0.8
0.7
0.5
Suction side

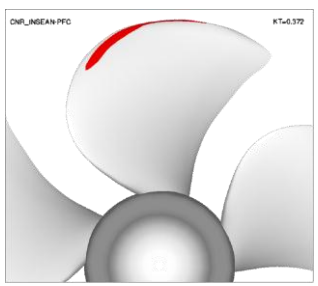

0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
c_p [-]
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
x/c [-]

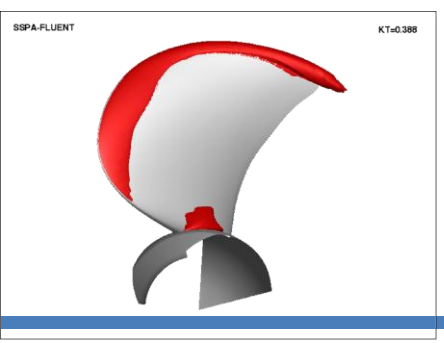
Case 2.3.1

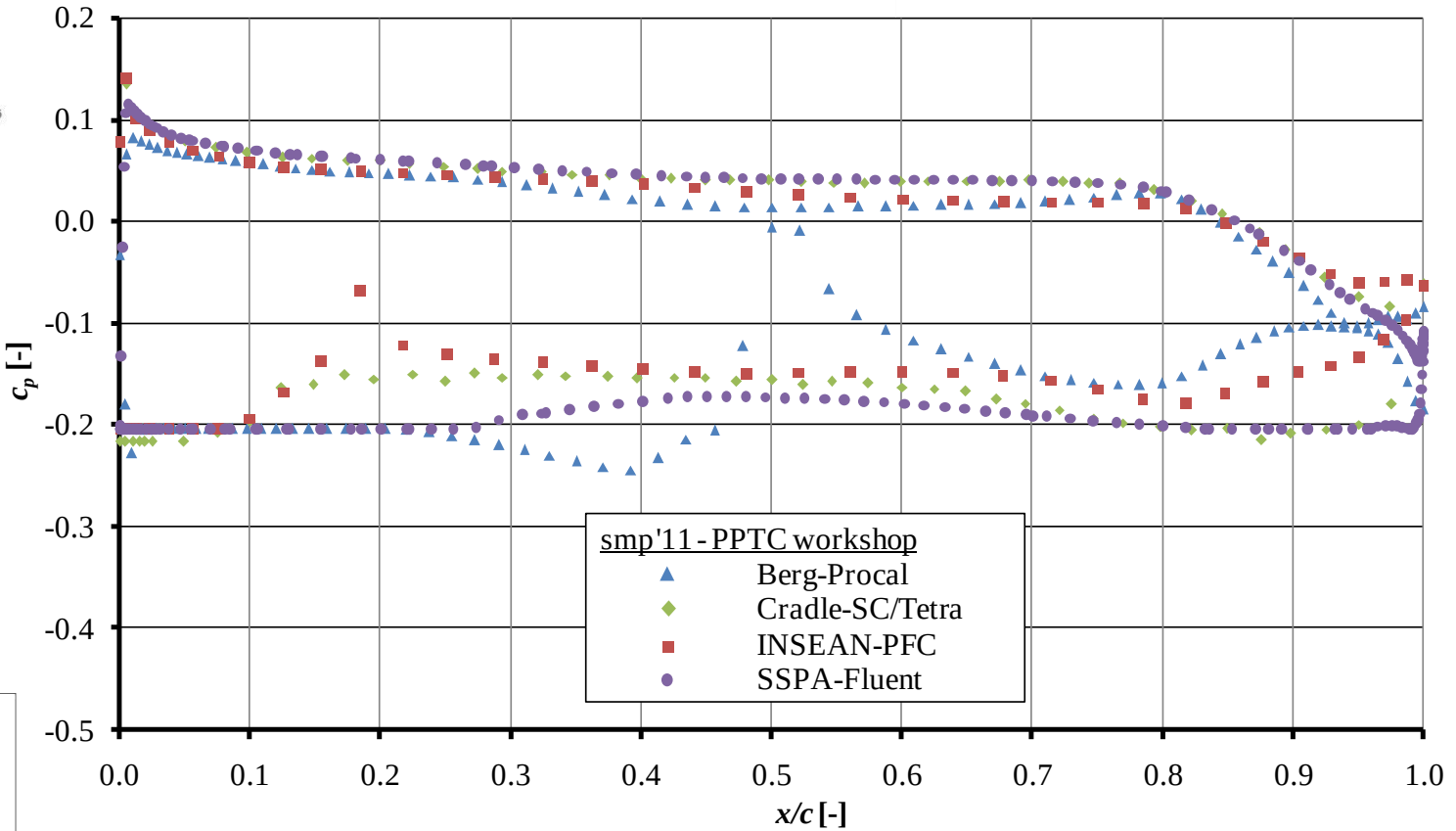

0.95
0.9
0.8
0.7
0.5
Suction side



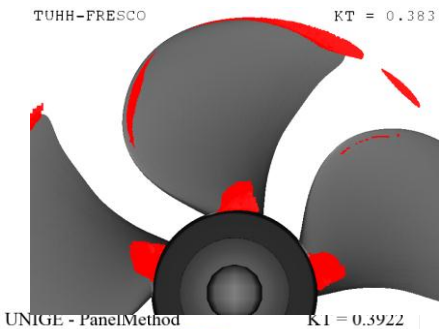

CRADLE-SC/Tetra
KT=0.375

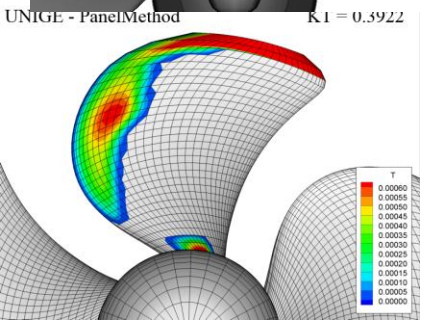


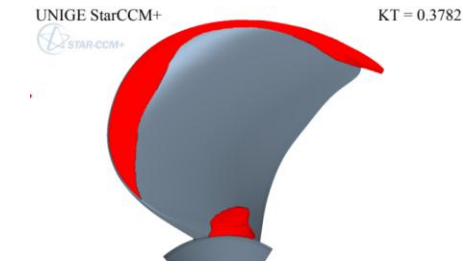

SSPA-FLUENT
KT=0.388

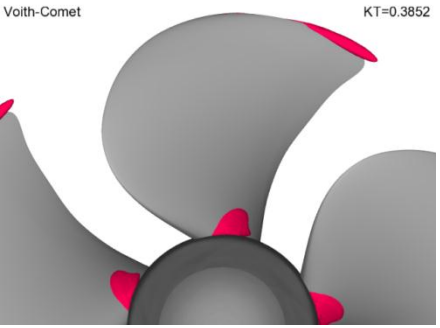

0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
c_p [-]
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
x/c [-]
smp'11 - PPTC workshop
Berg-Procal
Cradle-SC/Tetra
INSEAN-PFC
SSPA-Fluent

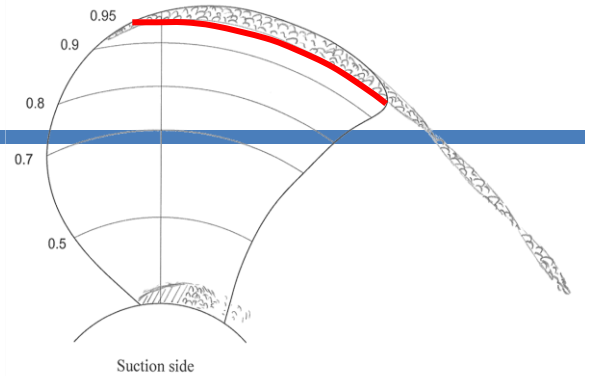
Case 2.3.1

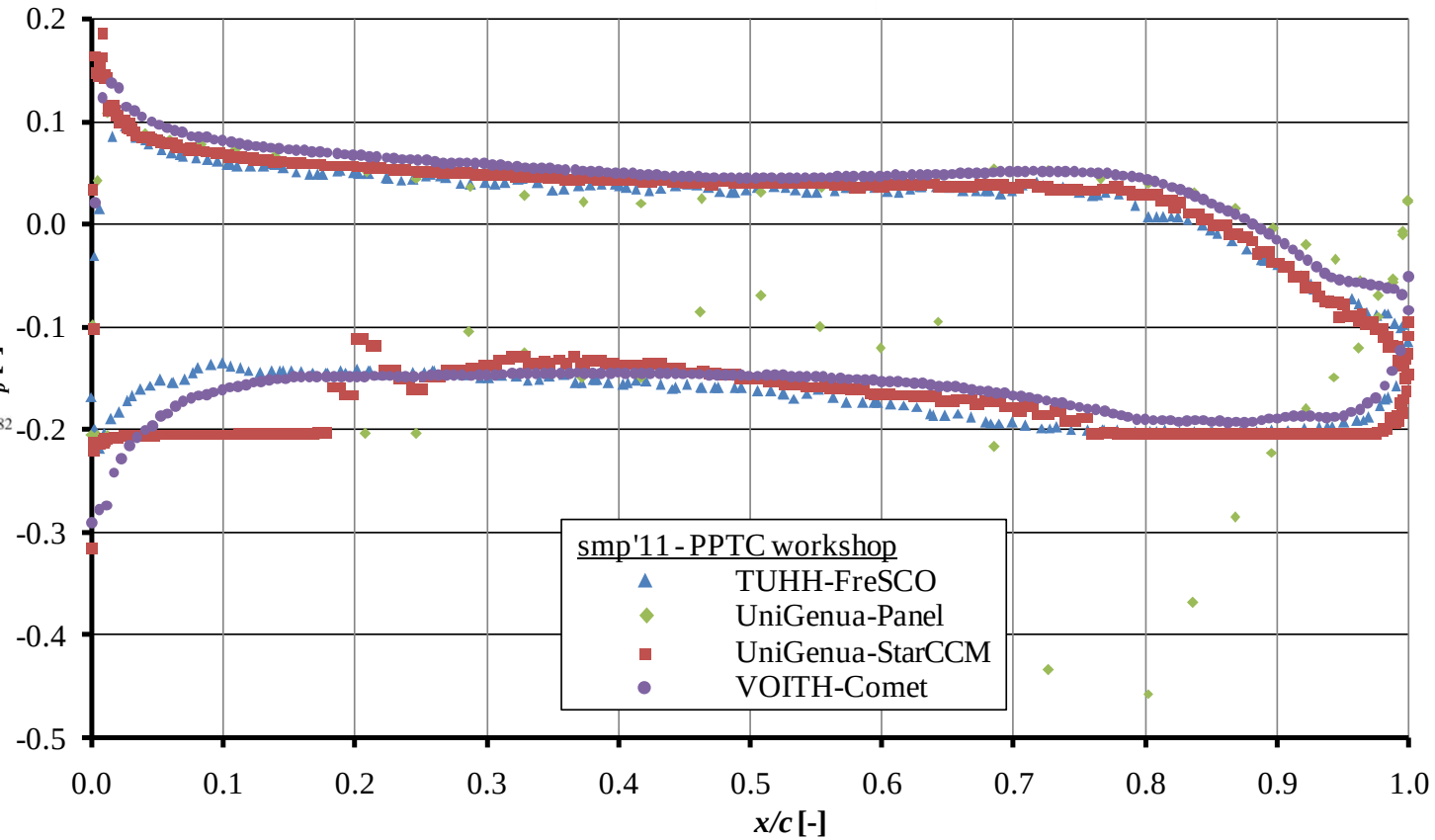

TUHH-FRESCO
KT = 0.383


UNIGE - PanelMethod
KT = 0.3922

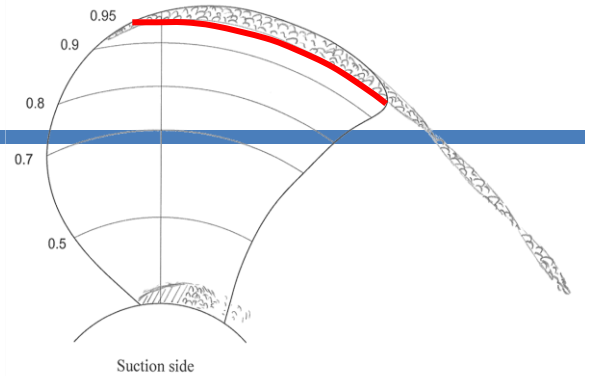

UNIGE StarCCM+
KT = 0.3782

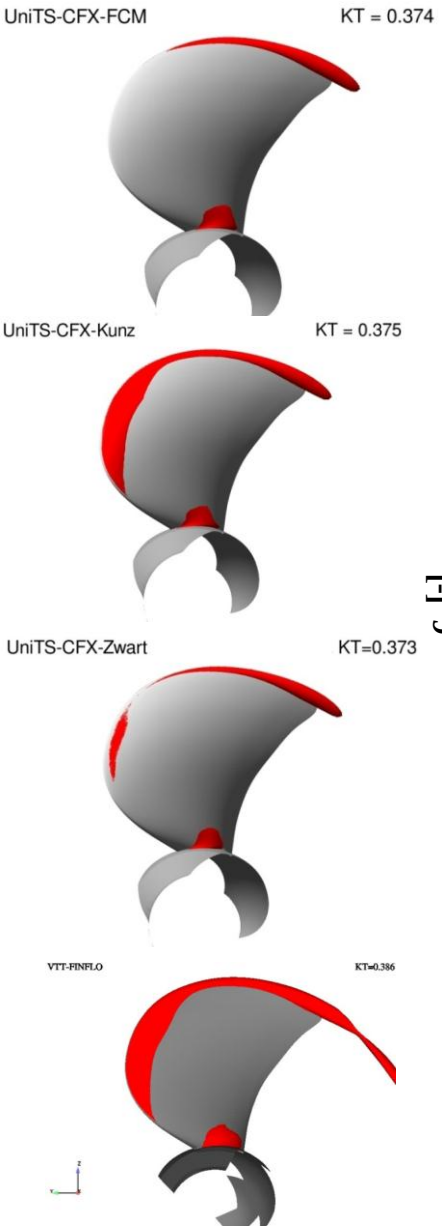

Voith-Comet
KT=0.3852

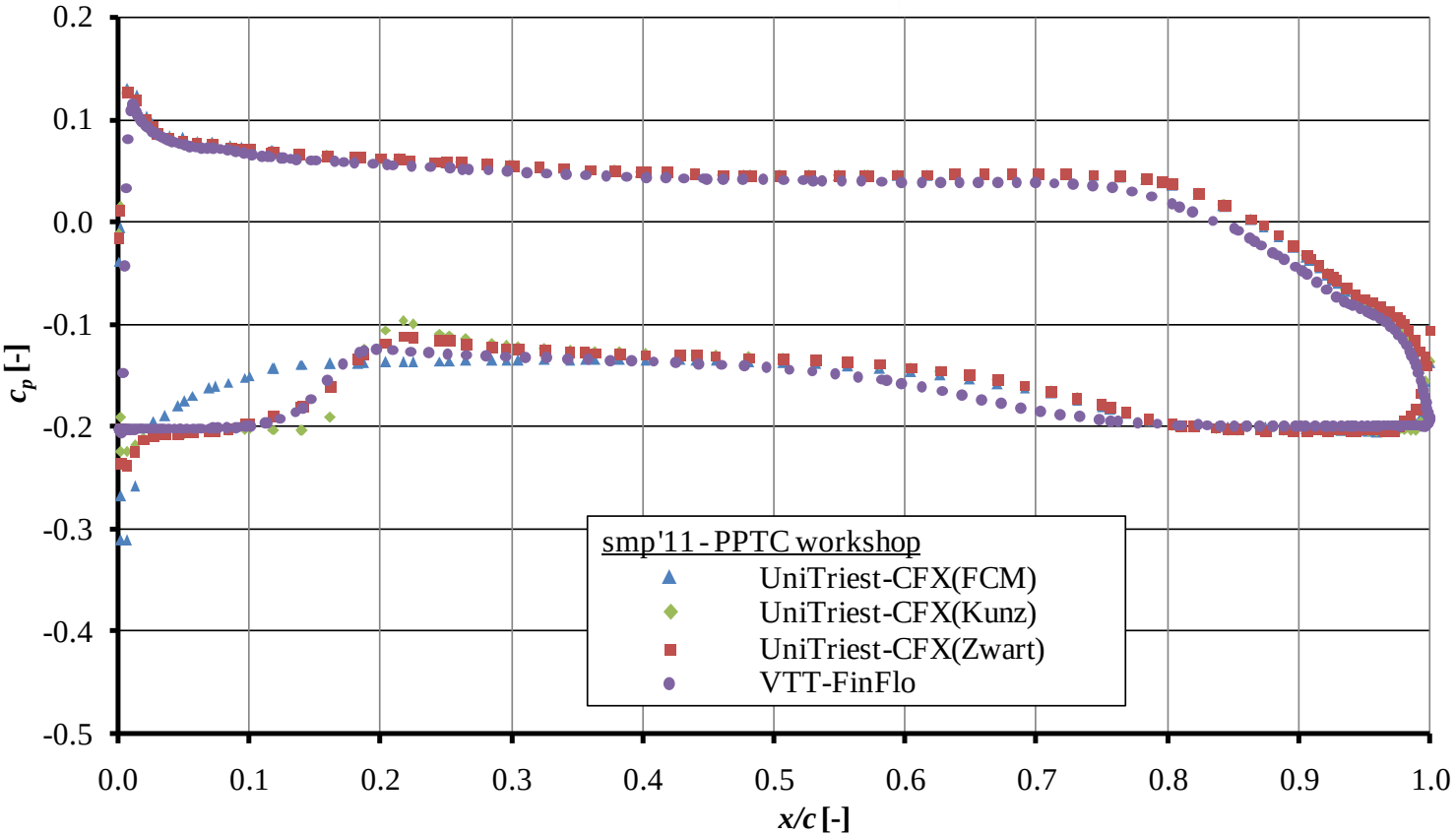

0.95
0.9
0.8
0.7
0.5
Suction side


0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
c_p [-]
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
x/c [-]
smp'11 - PPTC workshop
TUHH-FreSCO
UniGenua-Panel
UniGenua-StarCCM
VOITH-Comet

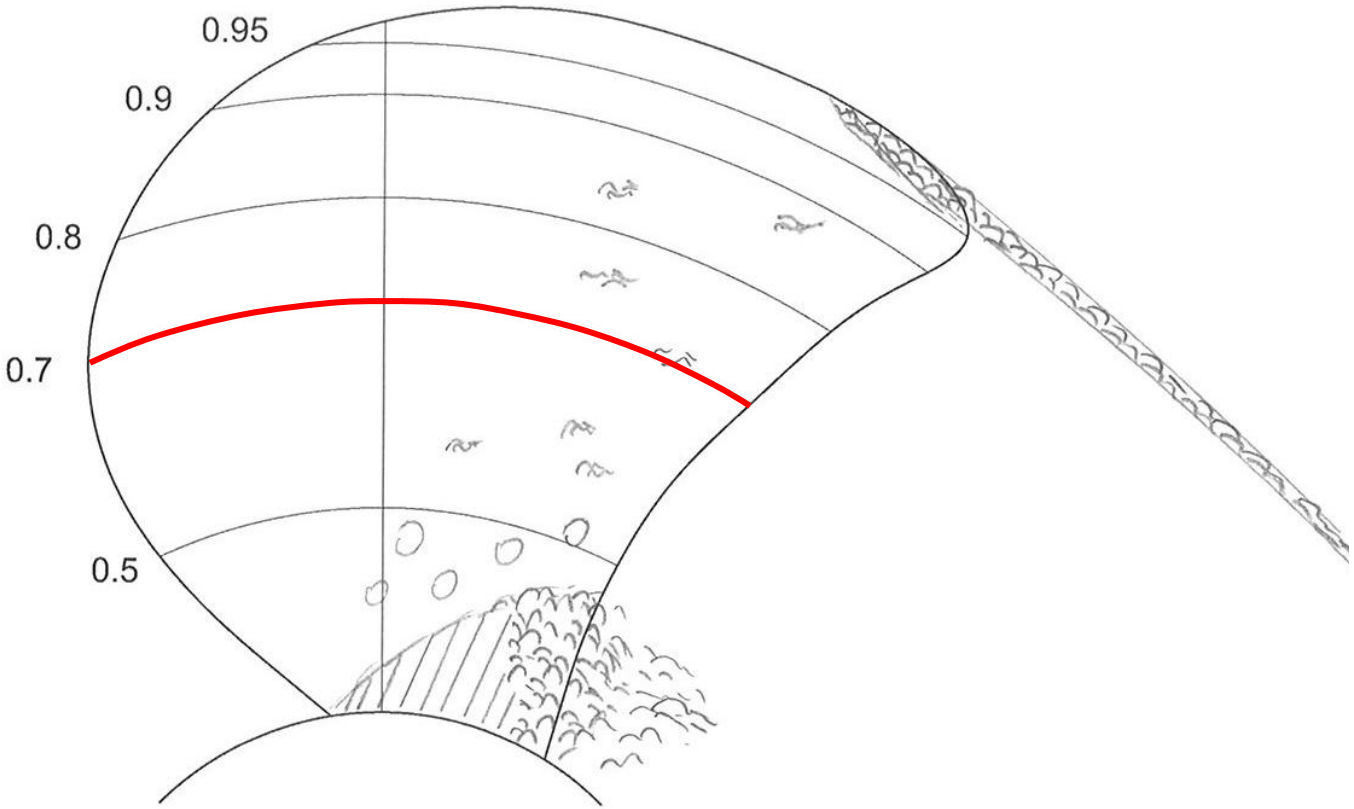
Case 2.3.1


0.95
0.9
0.8
0.7
0.5
Suction side


UniTS-CFX-FCM
KT = 0.374
UniTS-CFX-Kunz
KT = 0.375
UniTS-CFX-Zwart
KT=0.373
VTT-FINFLO
KT=0.386


0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
c_p [-]
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
x/c [-]
smp'11 - PPTC workshop
UniTriest-CFX(FCM)
UniTriest-CFX(Kunz)
UniTriest-CFX(Zwart)
VTT-FinFlo

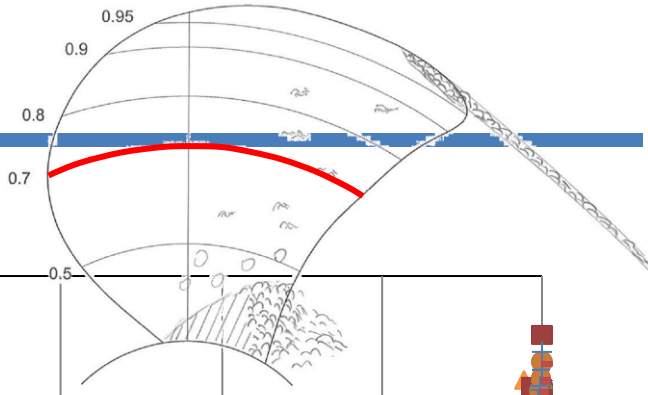
Case 2.3.2

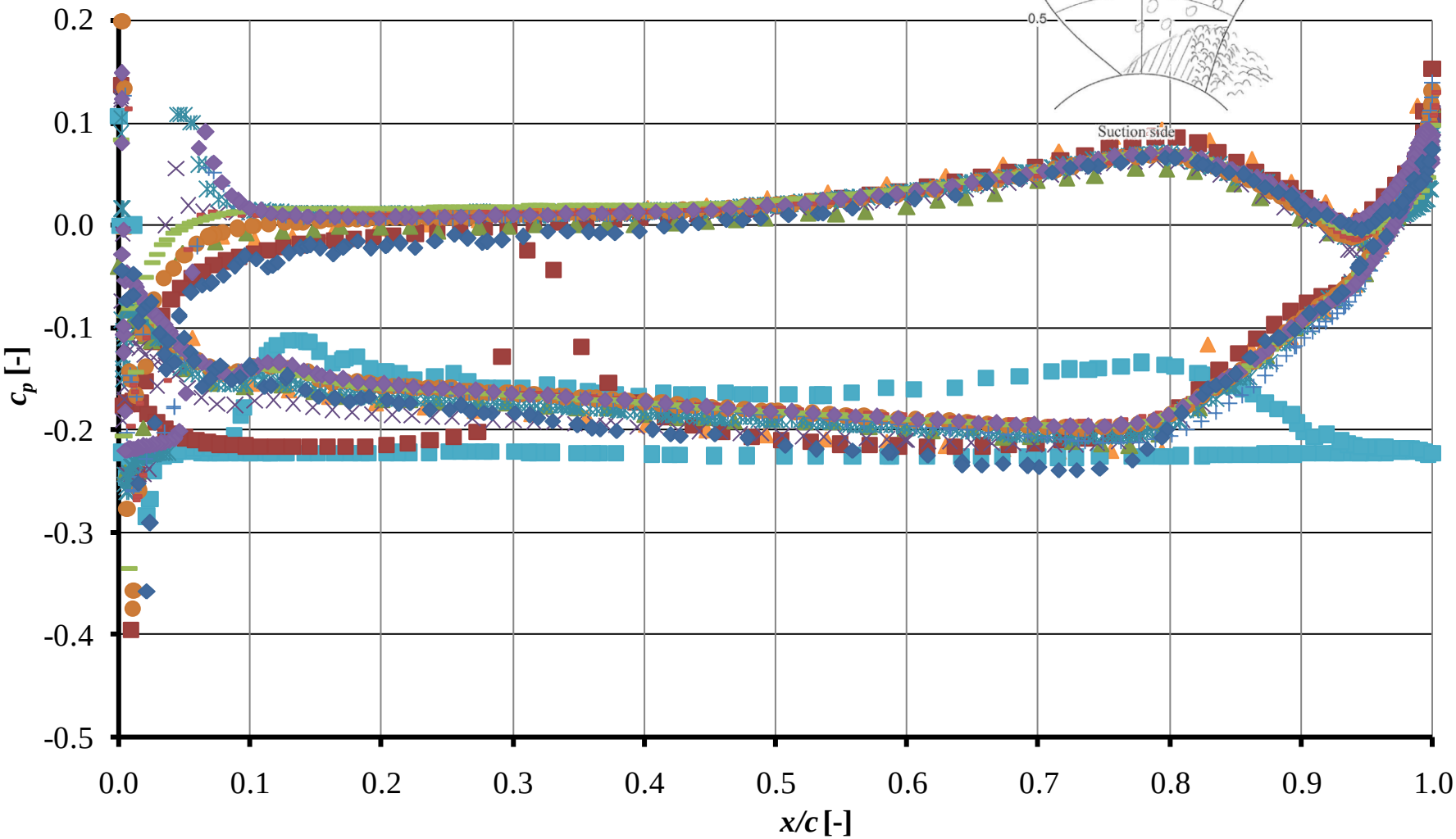


Suction side

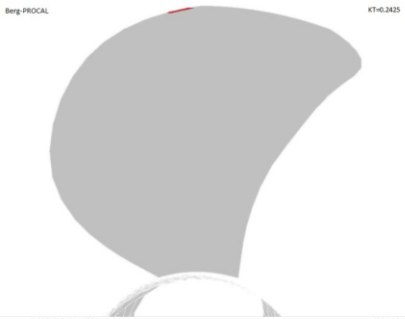
Advanced coefficient	J	[-]	1.269
Cavitation number	σ_n	[-]	1.424
Air content	α/α_s	[%]	53.5

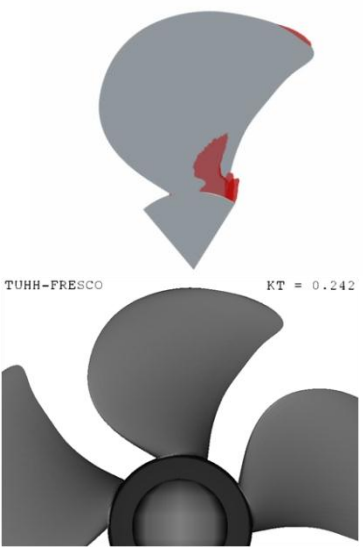
Case 2.3.2


0.95
0.9
0.8
0.7
0.5
Suction side

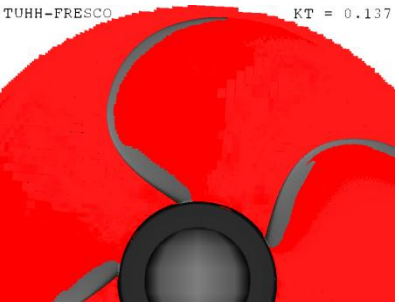

0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
c_p [-]
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
x/c [-]

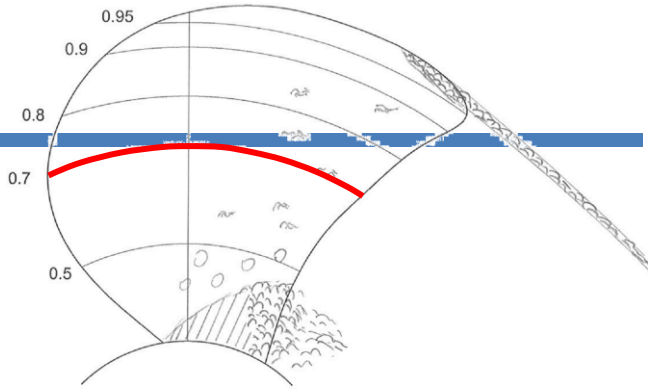
Case 2.3.2

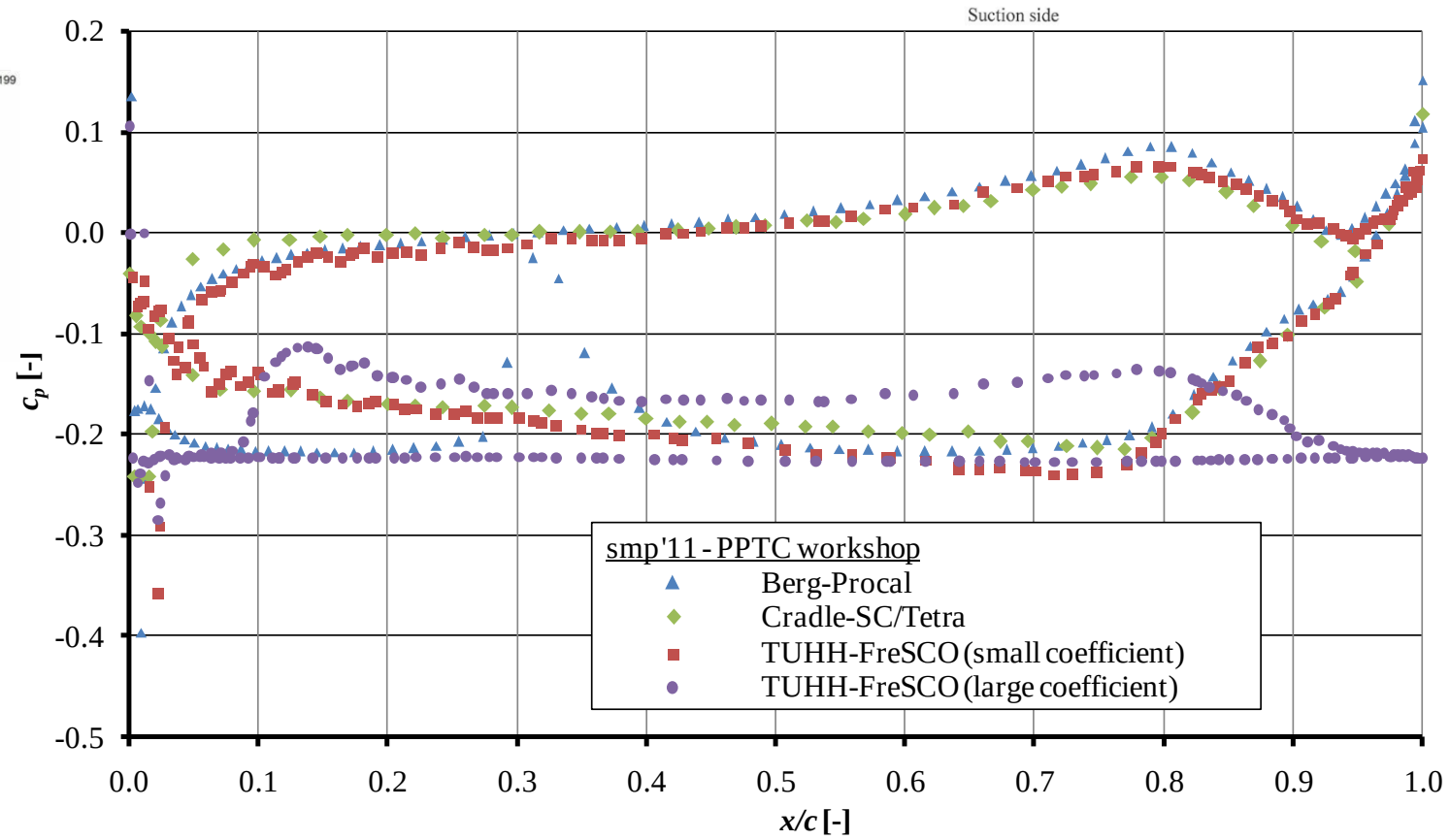



CRADLE-SC/Tetra
KT=0.199

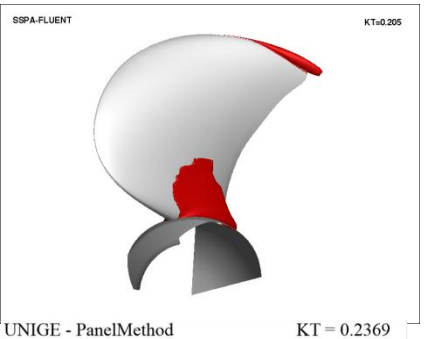
TUHH-FRESCO
KT = 0.242


TUHH-FRESCO
KT = 0.137

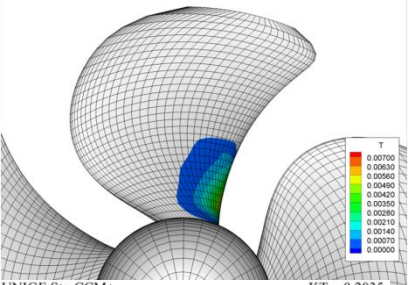

0.95
0.9
0.8
0.7
0.5


Suction side
0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
c_p [-]
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
x/c [-]
smp'11 - PPTC workshop
Berg-Procal
Cradle-SC/Tetra
TUHH-FreSCO (small coefficient)
TUHH-FreSCO (large coefficient)

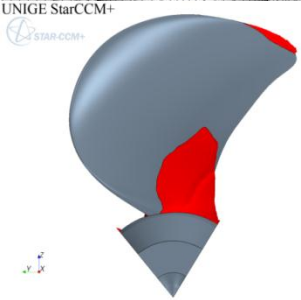
Case 2.3.2



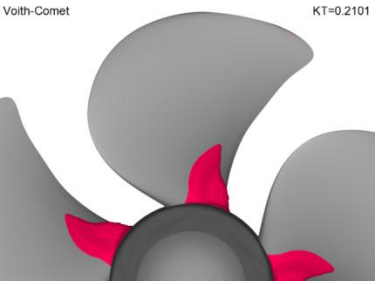
UNIGE - PanelMethod KT = 0.2369

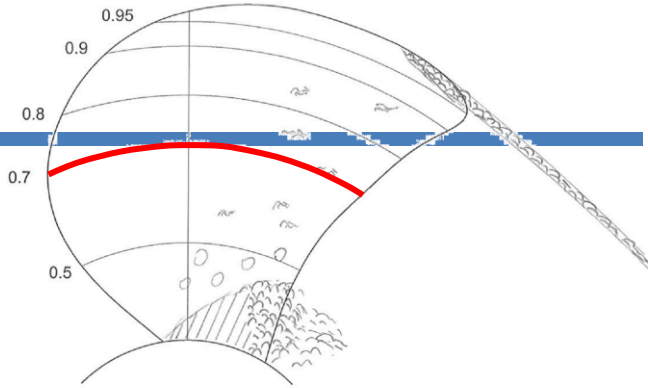


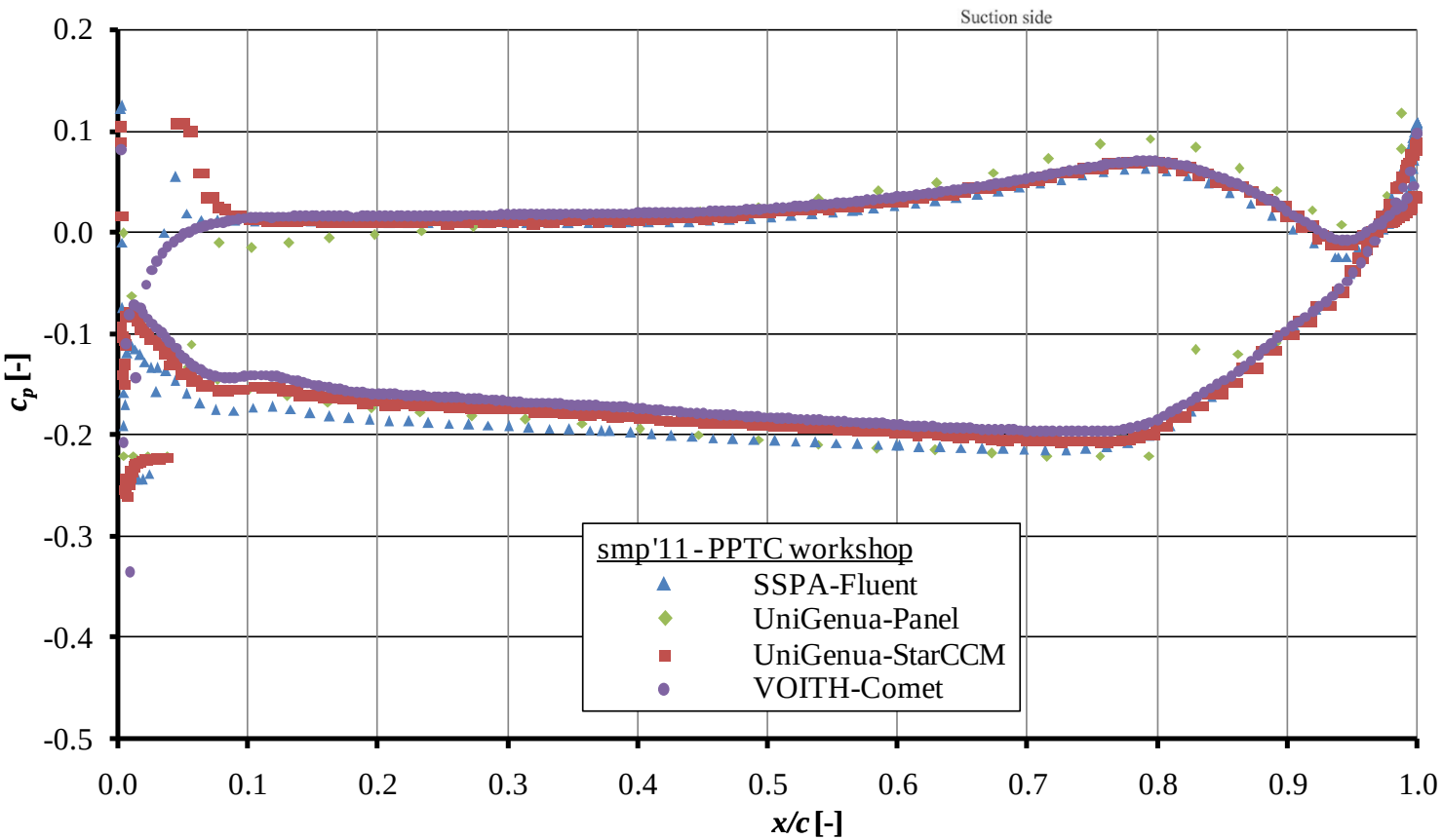
UNIGE StarCCM+ KT = 0.2035



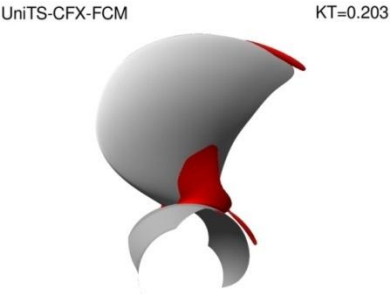
Voith-Comet KT=0.2101

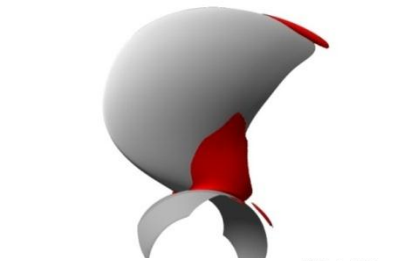


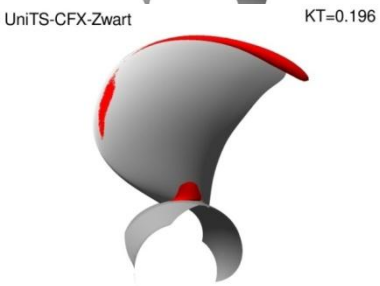


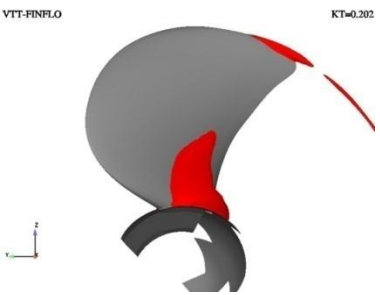


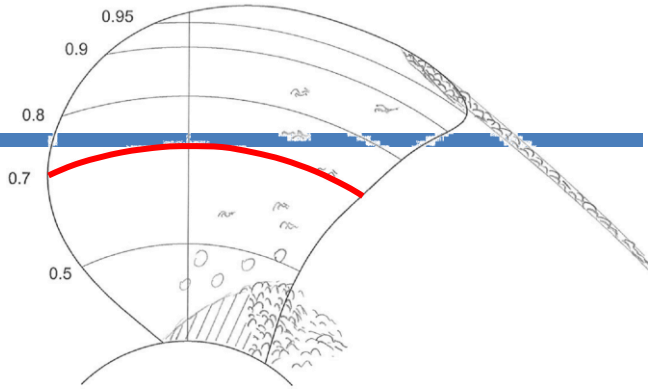
Case 2.3.2

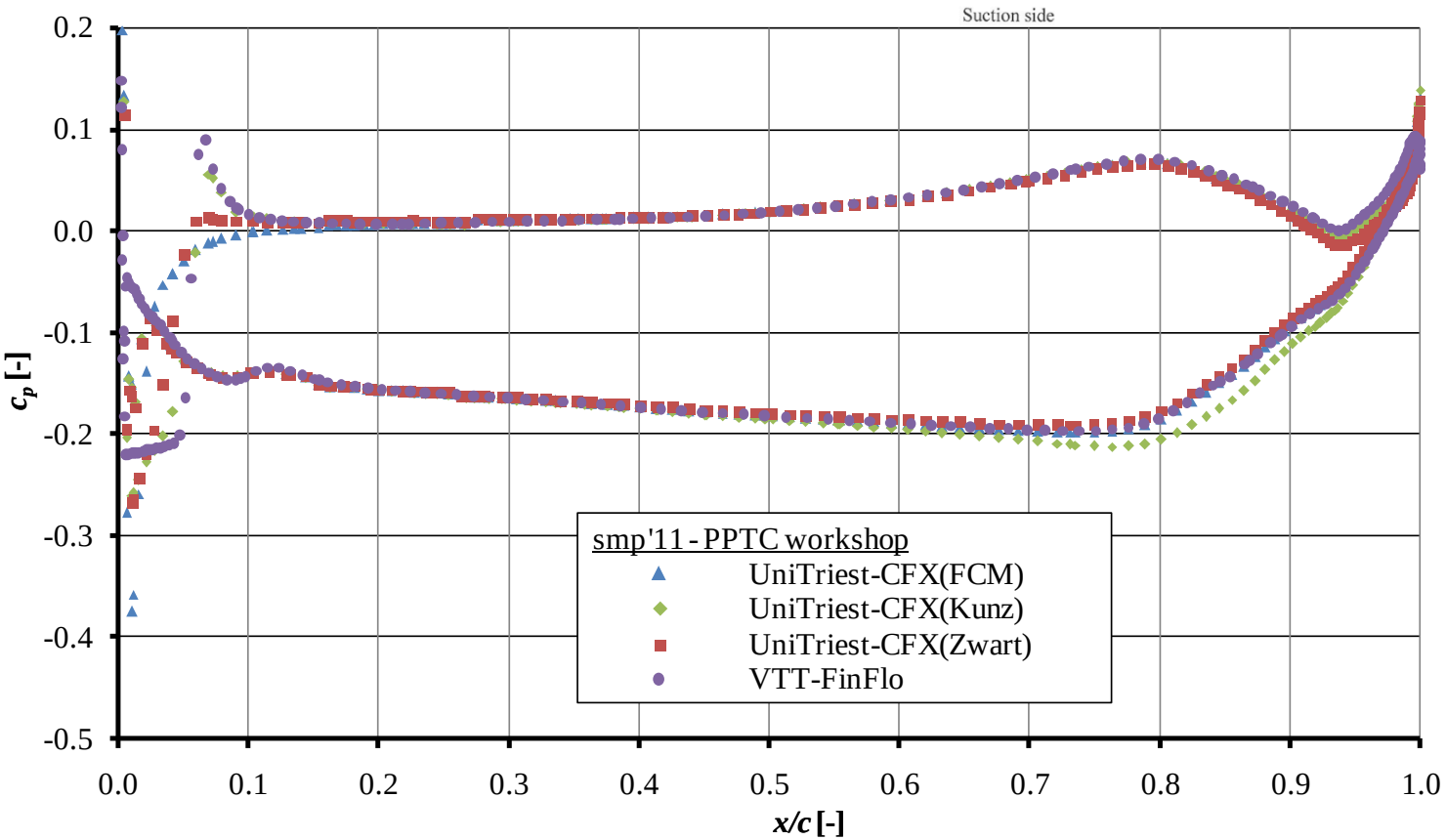

UniTS-CFX-FCM
KT=0.203


UniTS-CFX-Kunz
KT=0.210

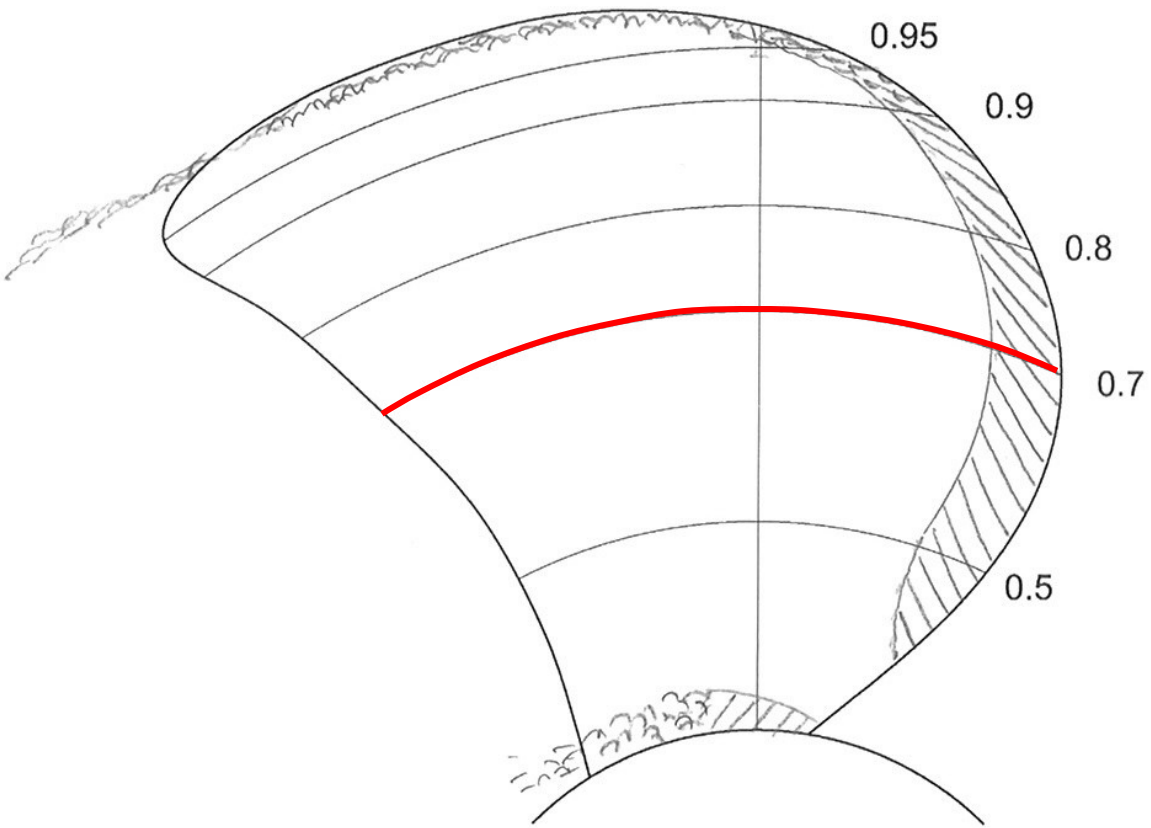

UniTS-CFX-Zwart
KT=0.196


VTT-FINFLO
KT=0.202


0.95
0.9
0.8
0.7
0.5

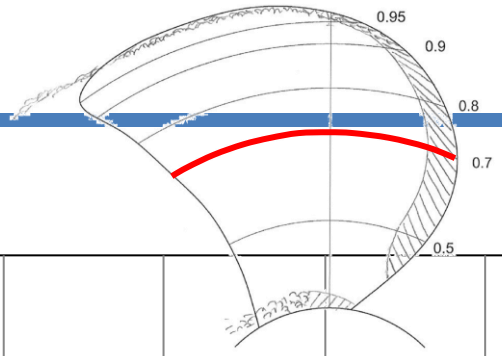

Suction side
0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
c_p [-]
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
x/c [-]
smp'11 - PPTC workshop
UniTriest-CFX(FCM)
UniTriest-CFX(Kunz)
UniTriest-CFX(Zwart)
VTT-FinFlo

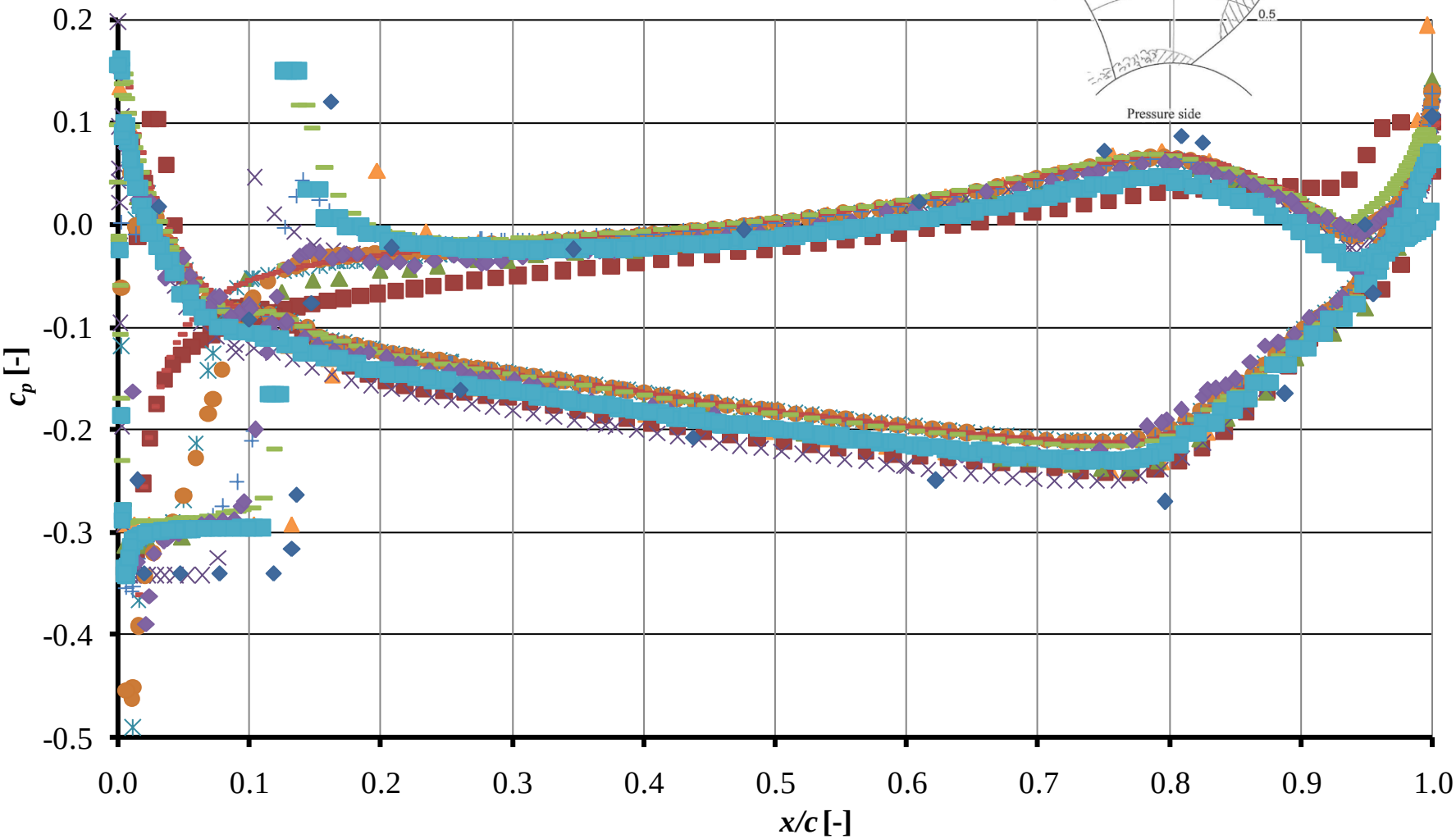
Case 2.3.3



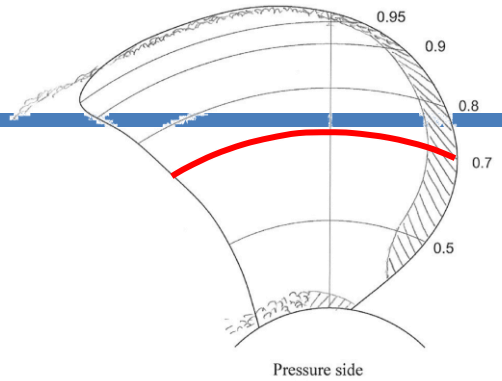
Advanced coefficient	J	[-]	1.408
Cavitation number	σ_n	[-]	2.000
Air content	α/α_s	[%]	58.5

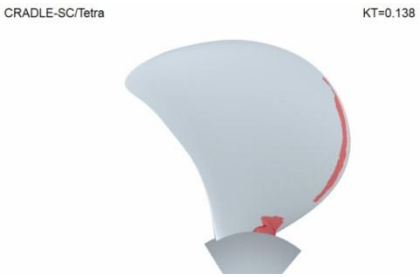
Case 2.3.3

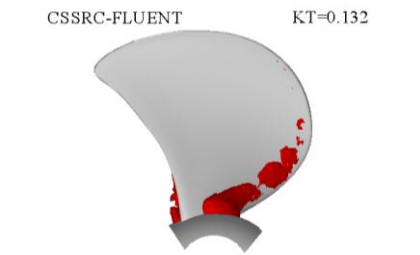

0.95
0.9
0.8
0.7
0.5
Pressure side

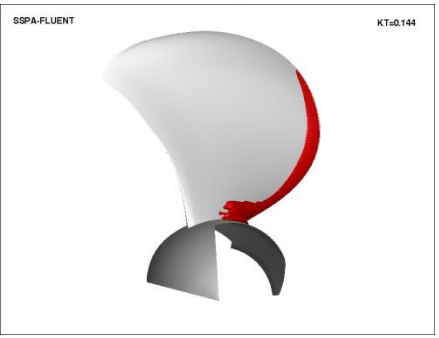

0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
c_p [-]
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
x/c [-]

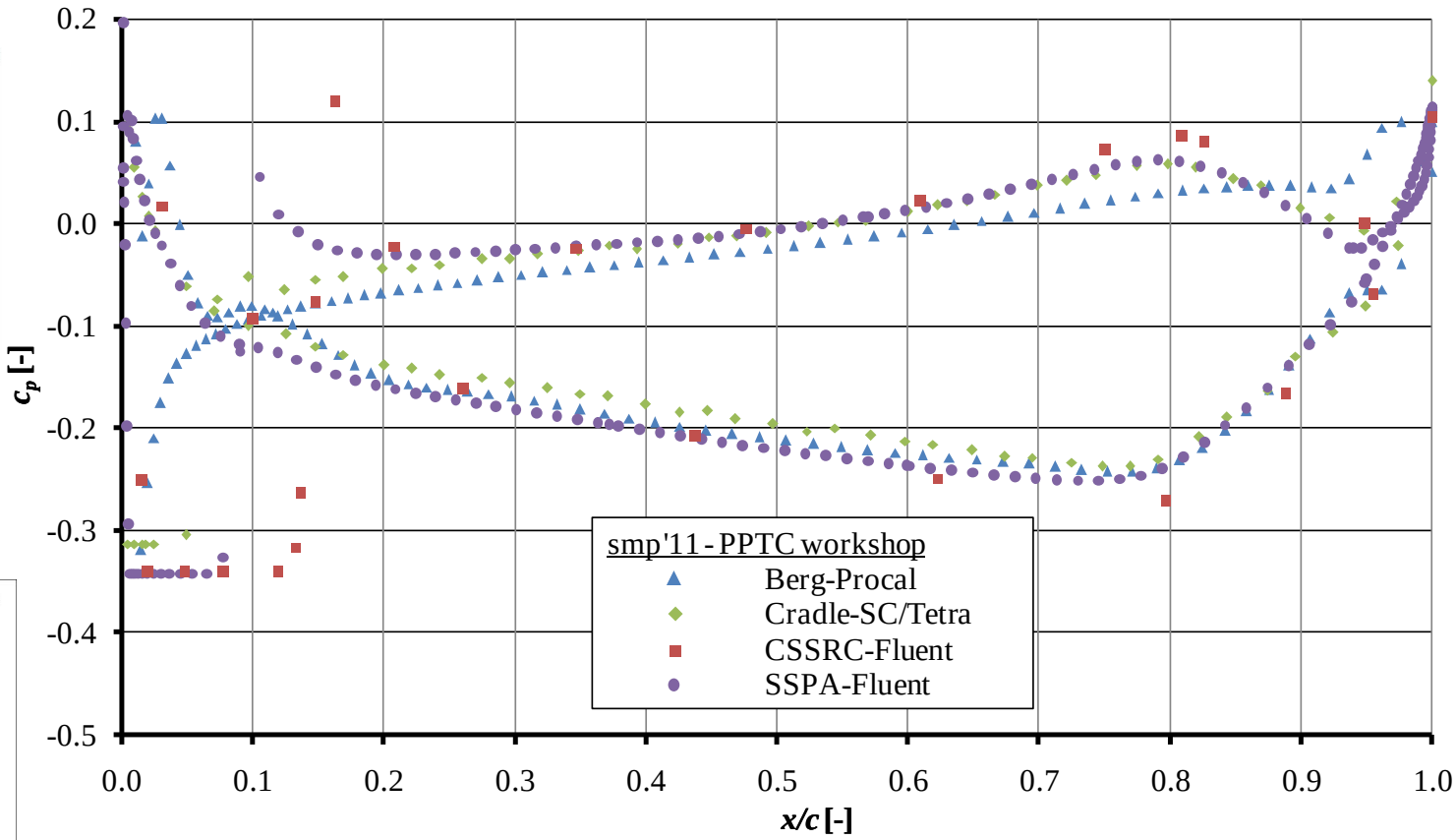
Case 2.3.3


0.95
0.9
0.8
0.7
0.5
Pressure side

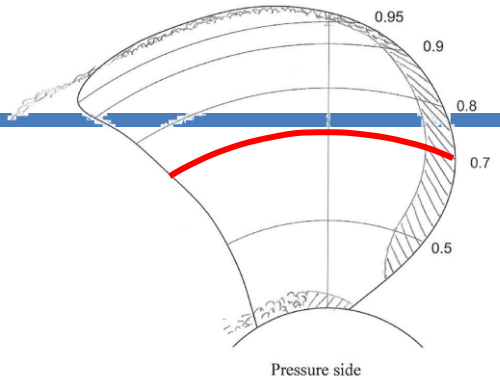

CRADLE-SC/Tetra
KT=0.138

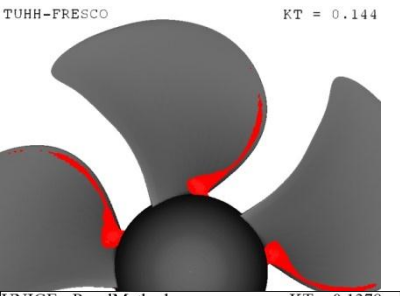

CSSRC-FLUENT
KT=0.132

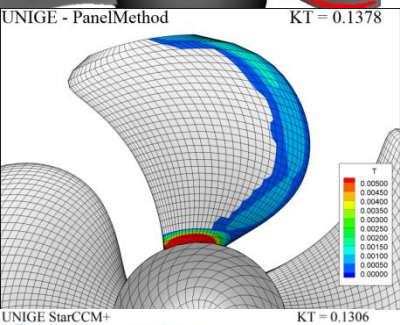

SSPA-FLUENT
KT=0.144

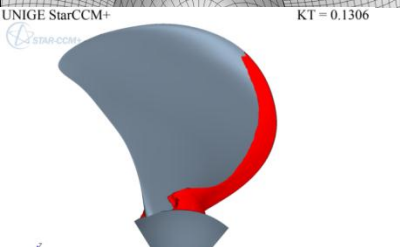

0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
c_p [-]
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
x/c [-]
smp'11 - PPTC workshop
Berg-Procal
Cradle-SC/Tetra
CSSRC-Fluent
SSPA-Fluent

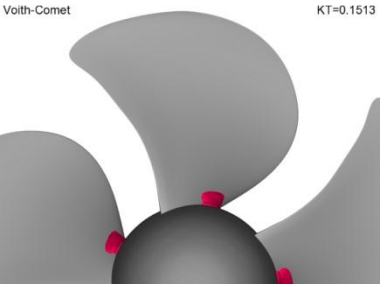
Case 2.3.3

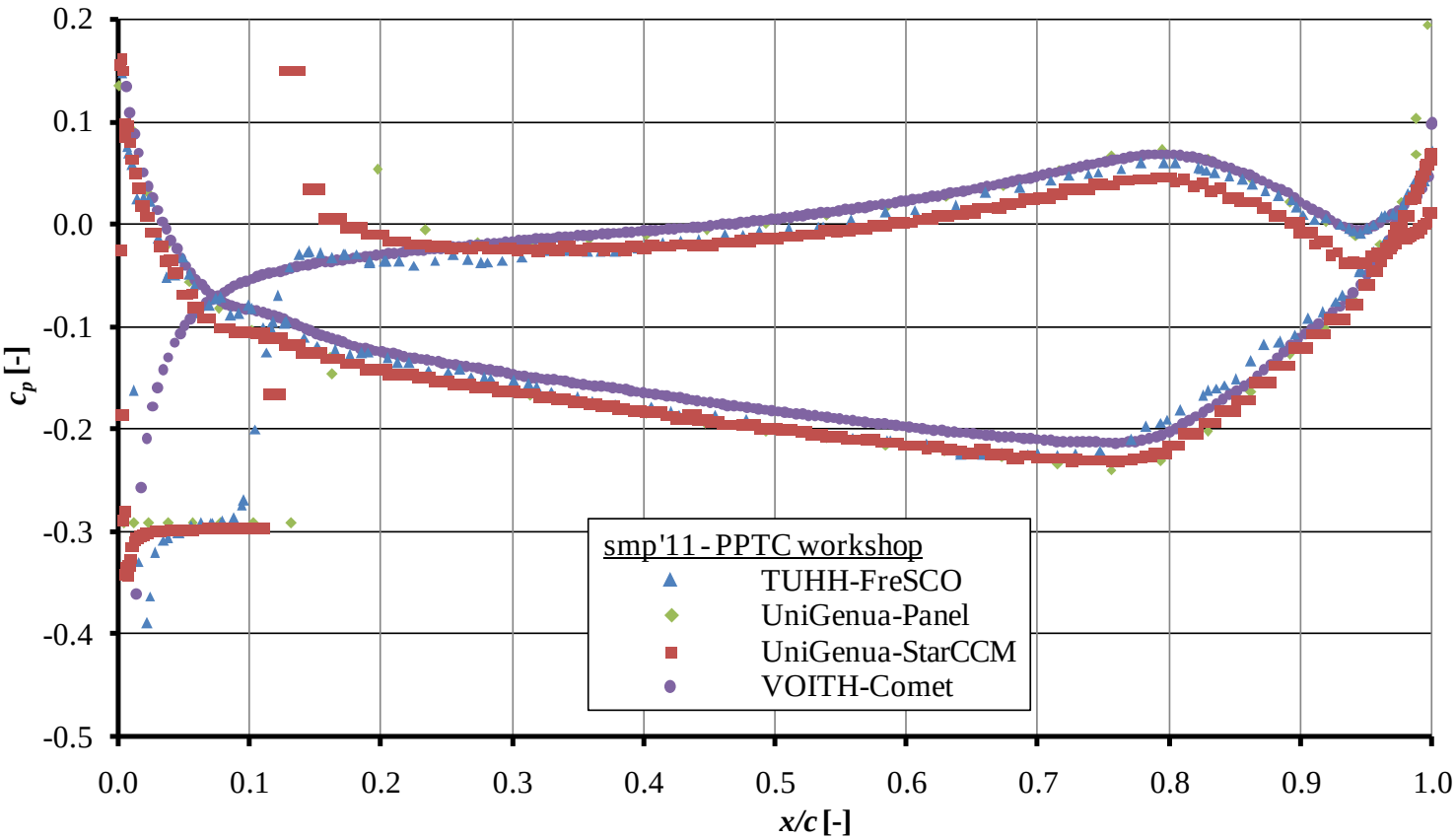

0.95
0.9
0.8
0.7
0.5
Pressure side


TUHH-FRESCO
KT = 0.144

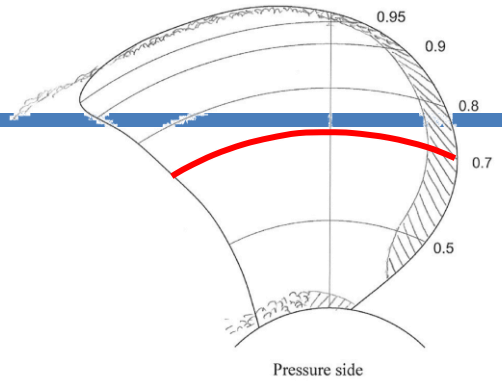

UNIGE - PanelMethod
KT = 0.1378

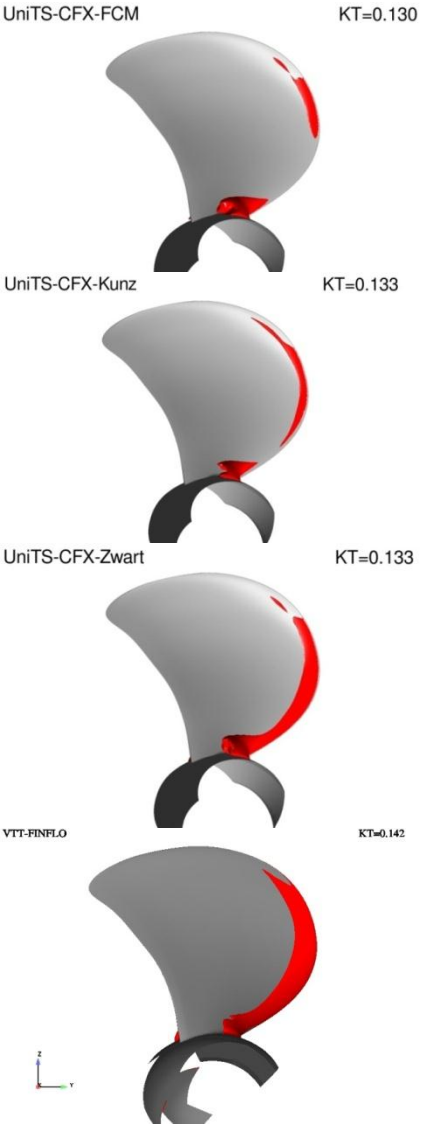

UNIGE StarCCM+
KT = 0.1306

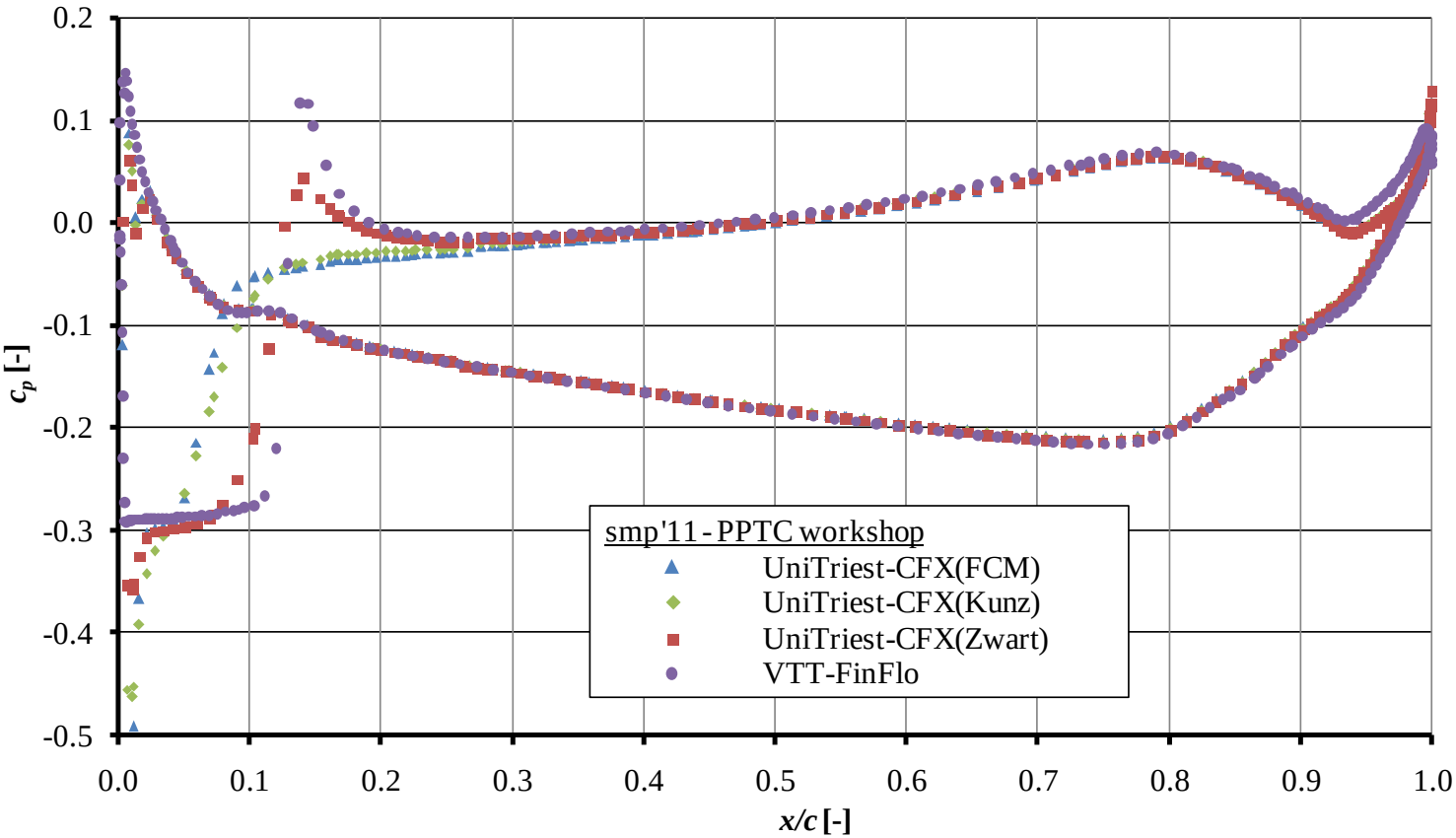

Voith-Comet
KT=0.1513


0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
c_p [-]
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
x/c [-]
smp'11 - PPTC workshop
TUHH-FreSCO
UniGenua-Panel
UniGenua-StarCCM
VOITH-Comet

Case 2.3.3


0.95
0.9
0.8
0.7
0.5
Pressure side


UniTS-CFX-FCM
KT=0.130
UniTS-CFX-Kunz
KT=0.133
UniTS-CFX-Zwart
KT=0.133
VTT-FINFLO
KT=0.142


0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
c_p [-]
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
x/c [-]
smp'11 - PPTC workshop
UniTriest-CFX(FCM)
UniTriest-CFX(Kunz)
UniTriest-CFX(Zwart)
VTT-FinFlo

Acknowledgements

The PPTC working group wishes to acknowledge the support for the Propeller Performance Workshop given by the organisation team of the smp'11.

Special thanks also to the participants; without whom the workshop could not have taken place.