

# **Potsdam Propeller Test Case (PPTC)**

## **Open Water Tests**

### **Case 2.1**

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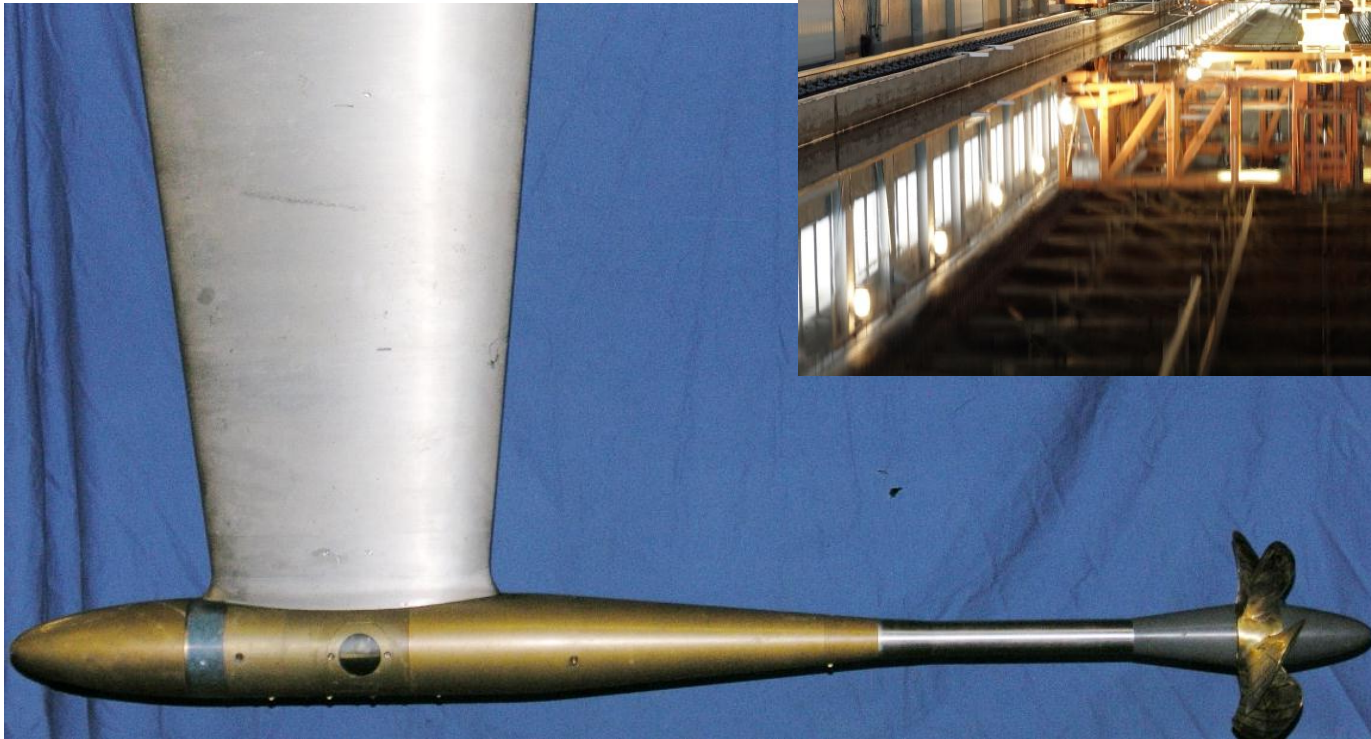
**Ulf Barkmann**

**Potsdam Model Basin (SVA)**



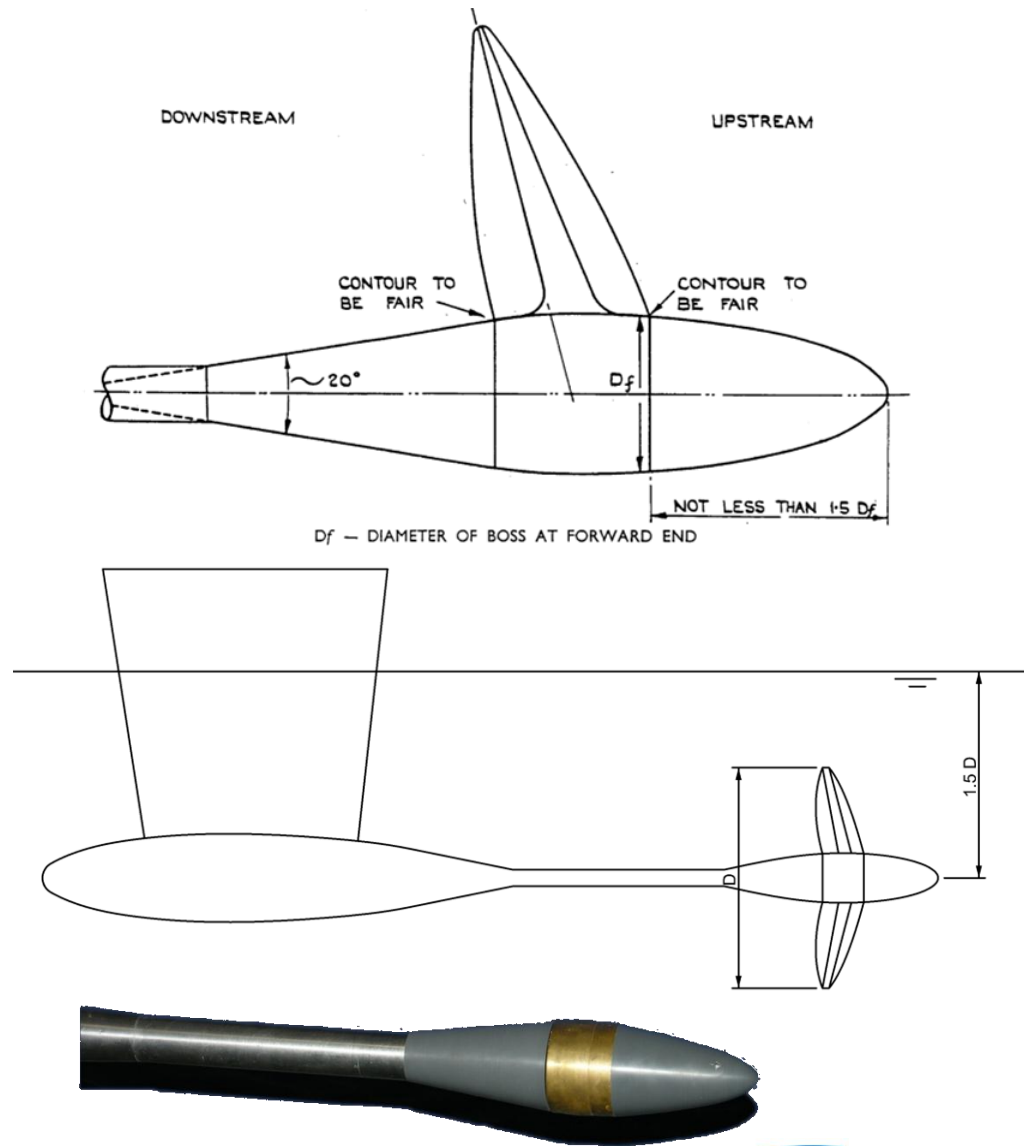
# Towing tank test

- Tests were conducted in the towing tank of the SVA
- Dynamometer mounted behind the propeller

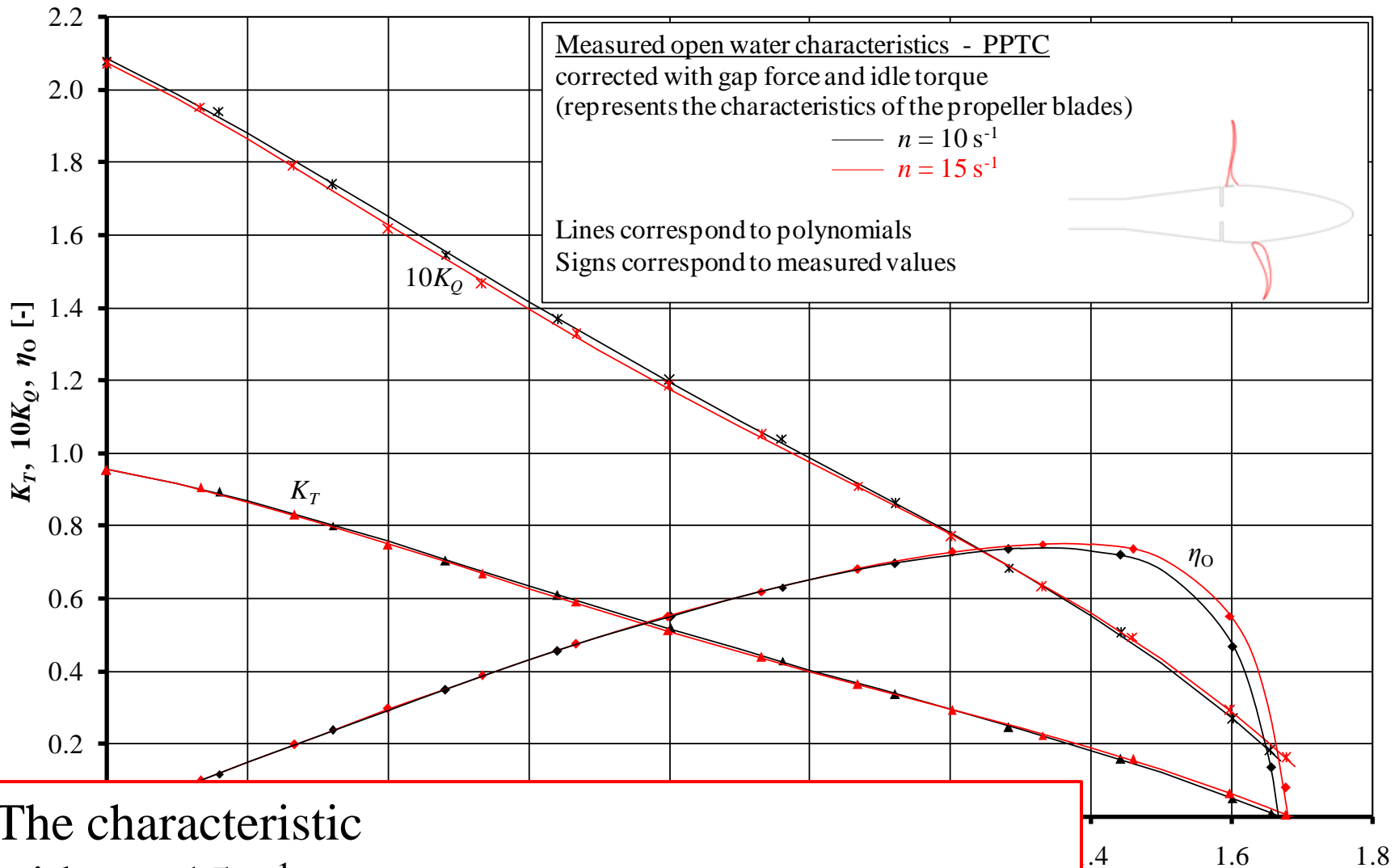


# Test arrangement

- The open water tests were carried out according to the ITTC recommended procedures:
- Streamlined cap longer than  $1.5 D_f$
- Cone with  $20^\circ$  opening angle
- Immersion of the dynamometer center line:  $1.5 D$
- Prior tests with cap and hub without blades
- Hub of the same weight and shape as the propeller hub with blades



# Open water characteristics



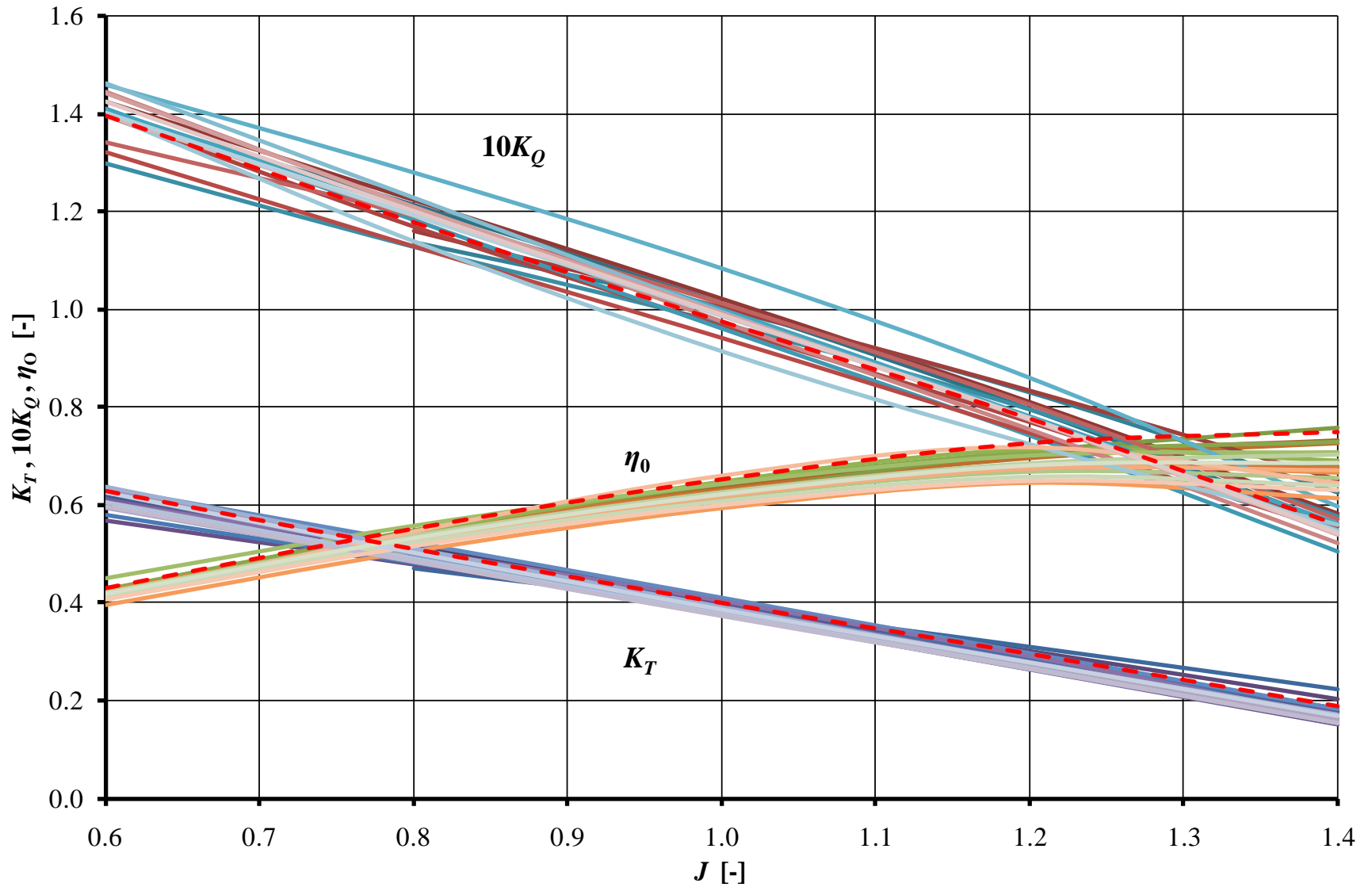
The characteristic  
with  $n = 15 \text{ s}^{-1}$   
is selected for the comparison with the calculation

# Participants

14 groups, 13 solvers, 19 calculations

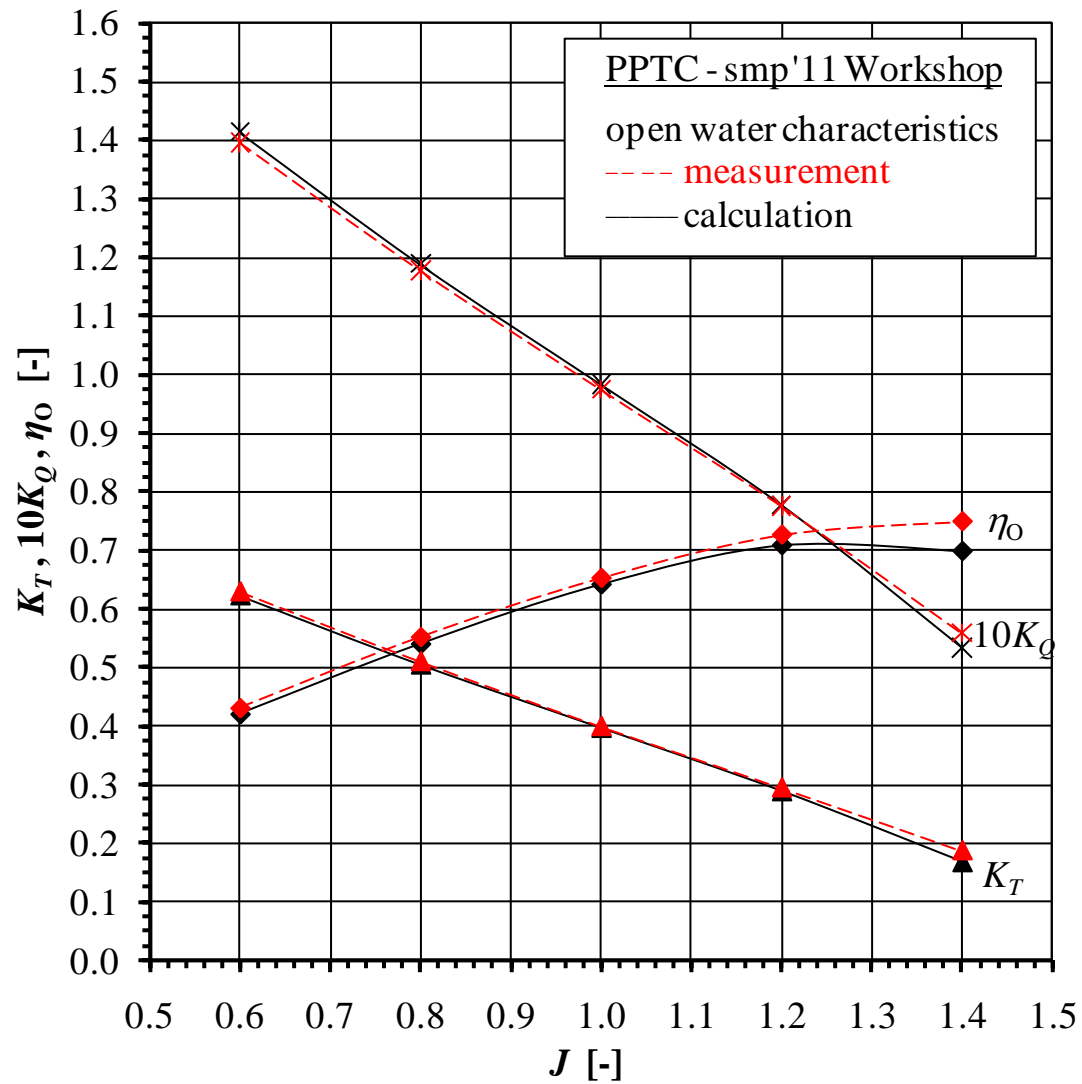
Group	Solver	Acronym
Berg-Propulsion	OpenFOAM	Berg-OpenFOAM
Cradle	SC/Tetra	Cradle-SC/Tetra
CSSRC	ANSYS Fluent	CSSRC-Fluent
HSVA	PPB	HSVA-PPB
	QCM	HSVA-QCM
INSEAN	PFC	INSEAN-PFC
MARIC	ANSYS Fluent	MARIC-Fluent
SSPA	ANSYS Fluent	SSPA-Fluent
SVA	Vortex	SVA-Vortex
TUHH	FreSCO+	TUHH-FreSCO
University of Genua	Panel	UniGenua-Panel
	OpenFOAM	UniGenua-OpenFOAM
	StarCCM+	UniGenua-StarCCM(kw)
	StarCCM+	UniGenua-StarCCM(ke)
University of Trieste	ANSYS CFX	UniTriest-CFX
VicusDT	StarCCM+	VicusDT-StarCCM
VOITH	Comet	VOITH-Comet
	OpenFOAM	VOITH-OpenFOAM
VTT	FinFlo	VTT-FinFlo

# All characteristics

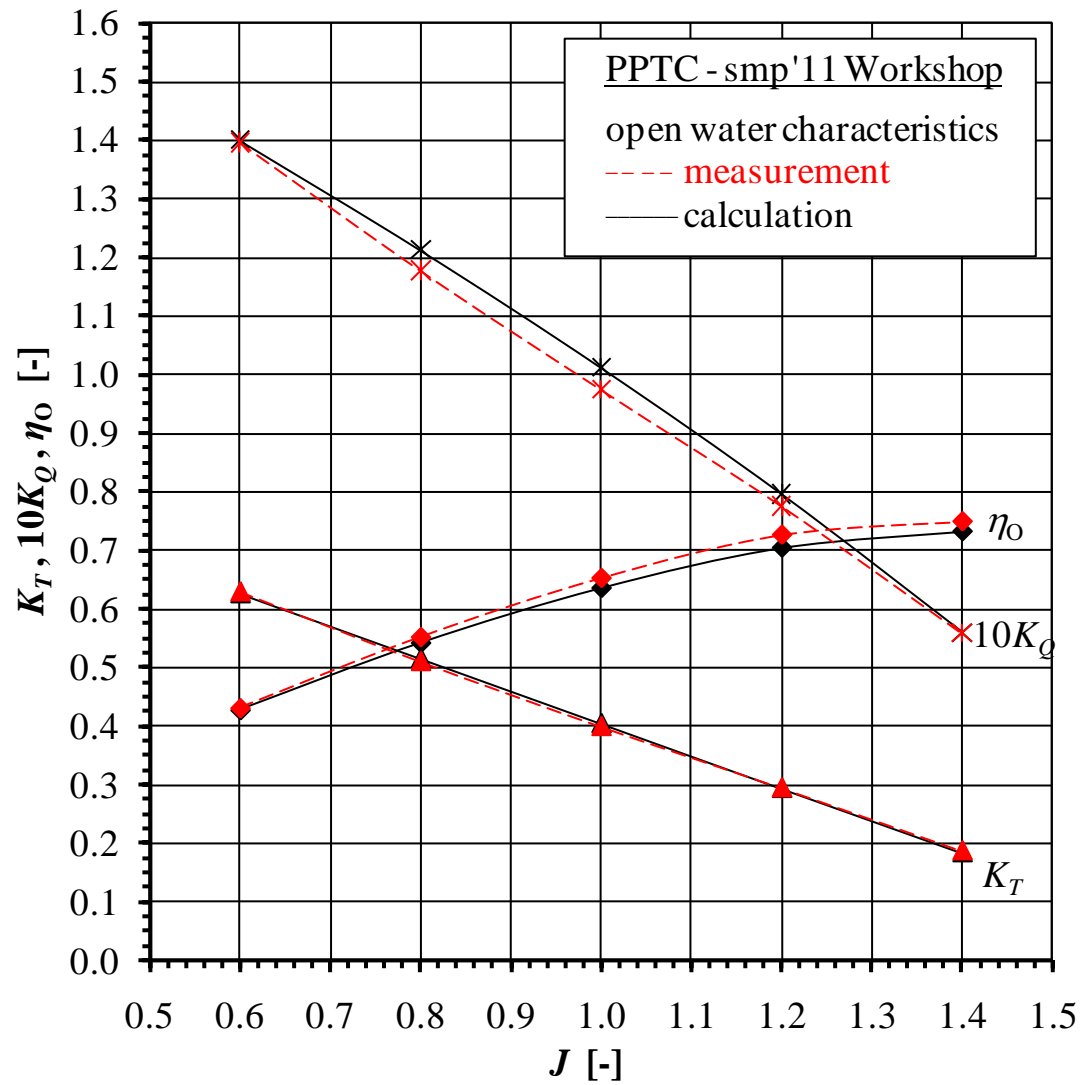




# Berg-Propulsion OpenFOAM

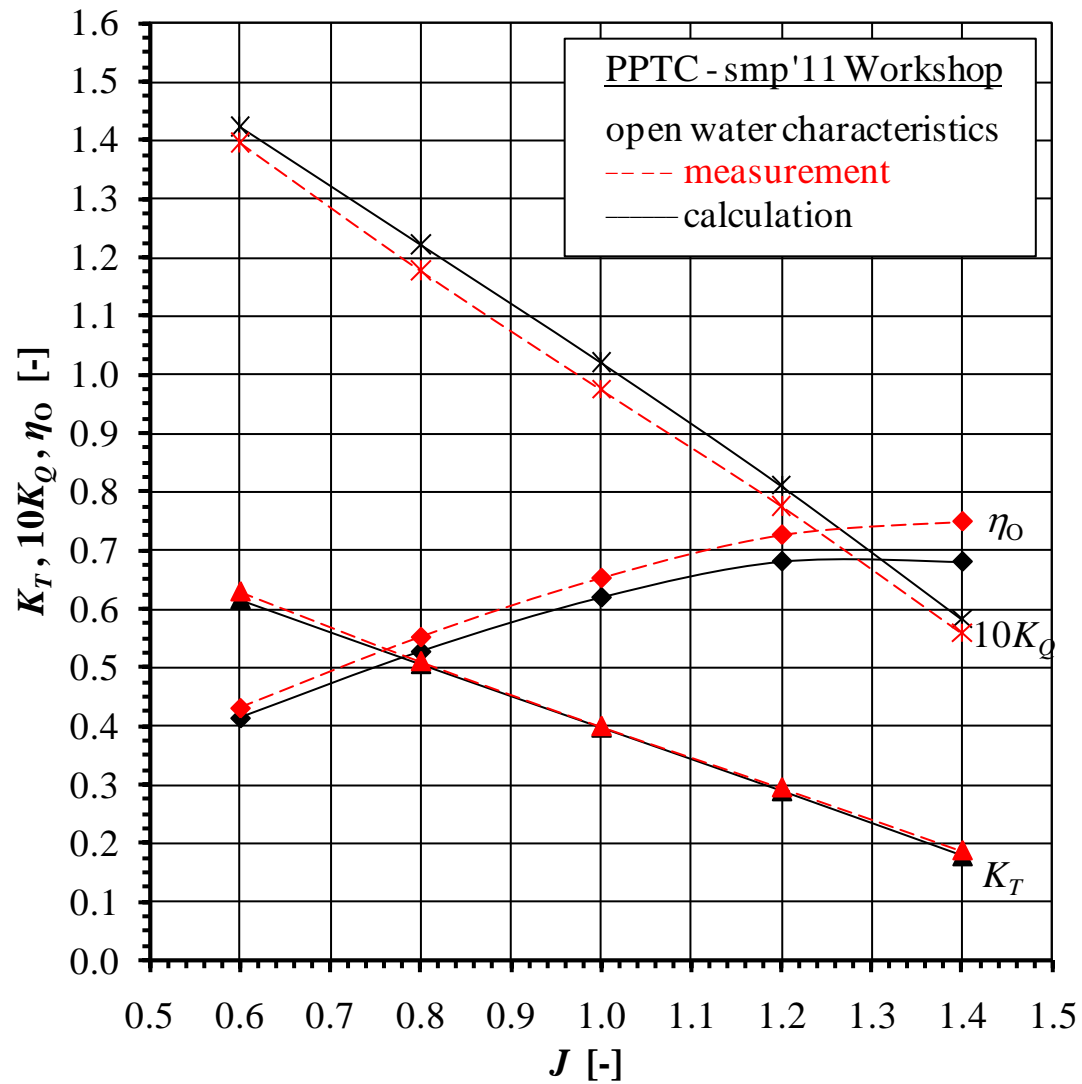


# Cradle SC/Tetra

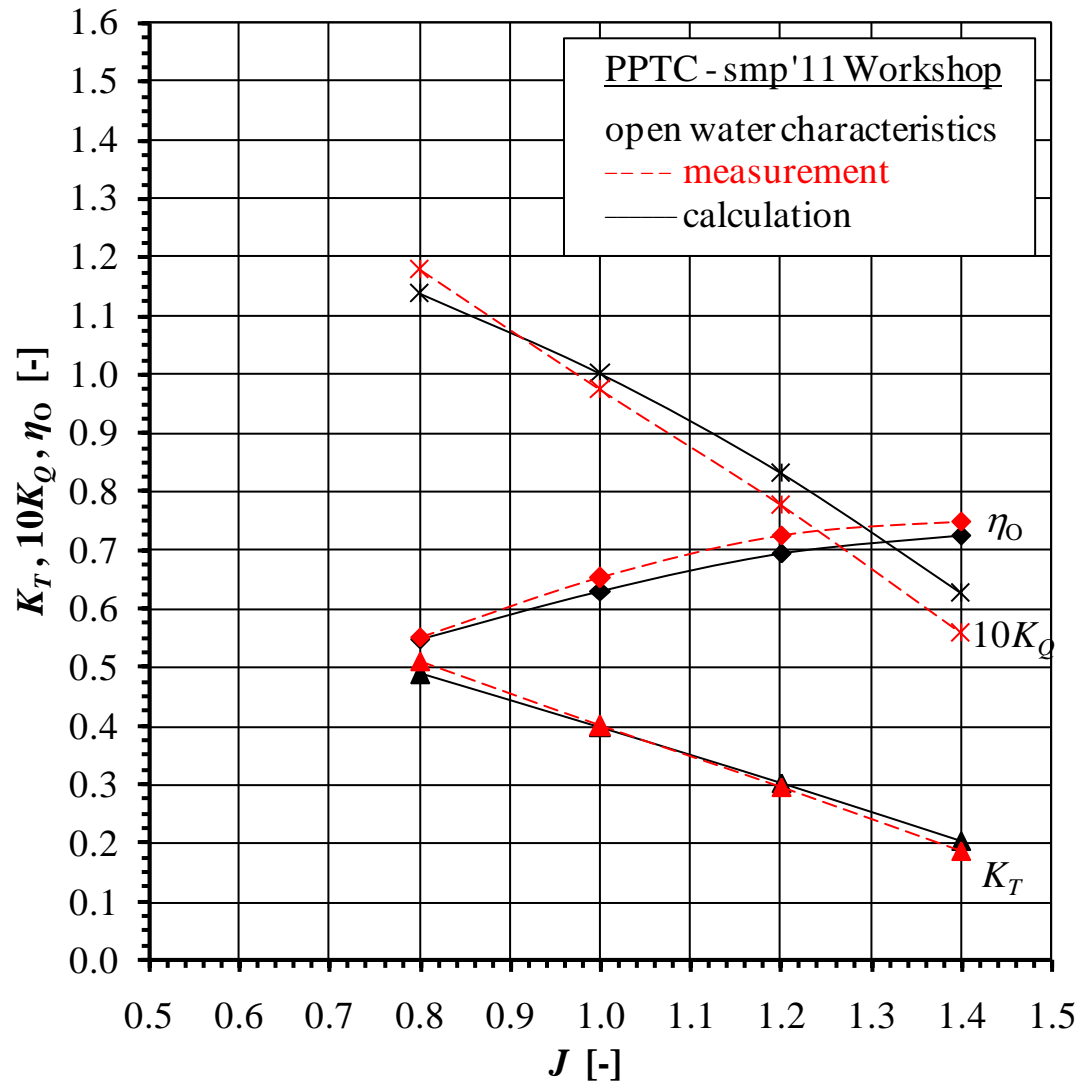




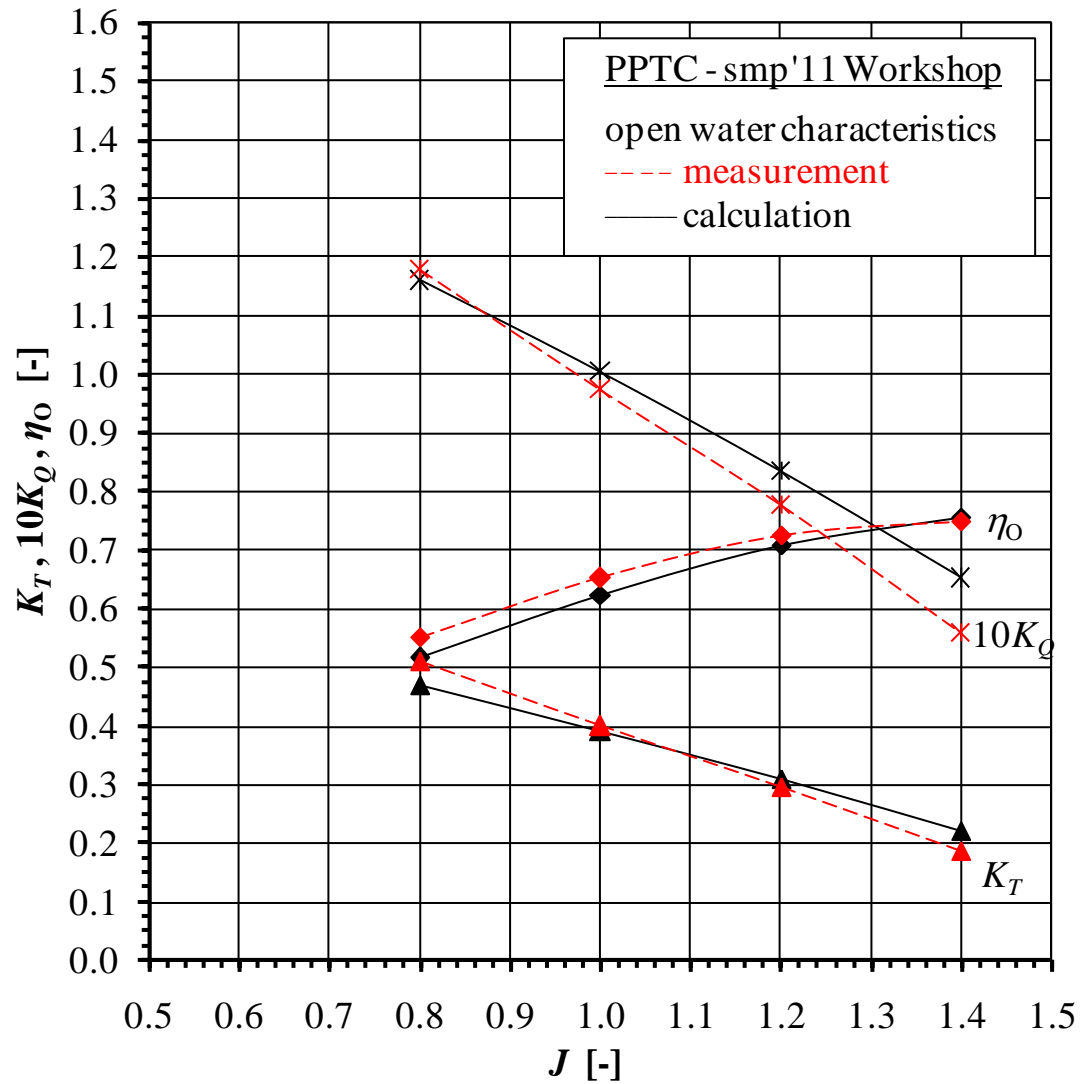
# CSSRC ANSYS Fluent



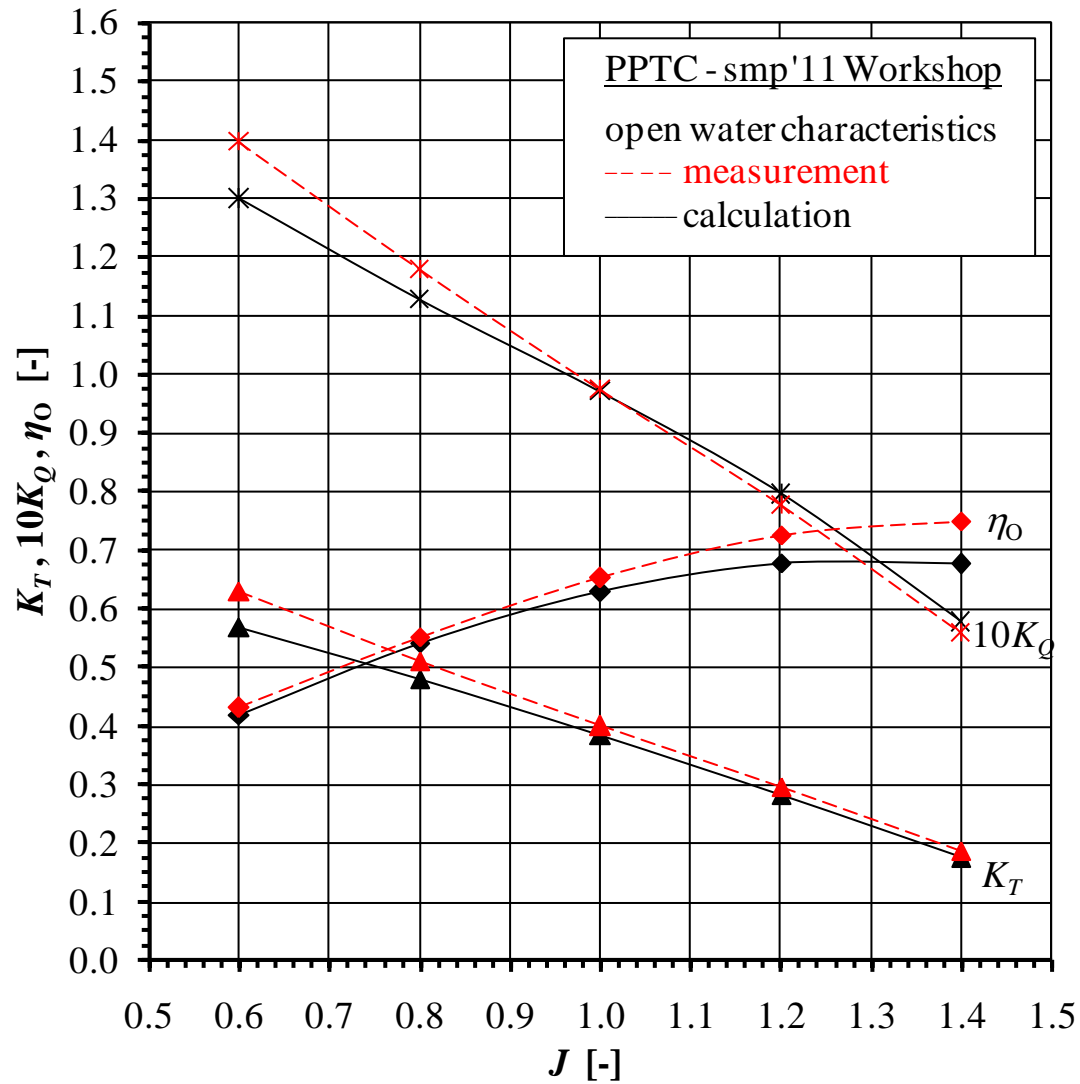
# HSVA PPB



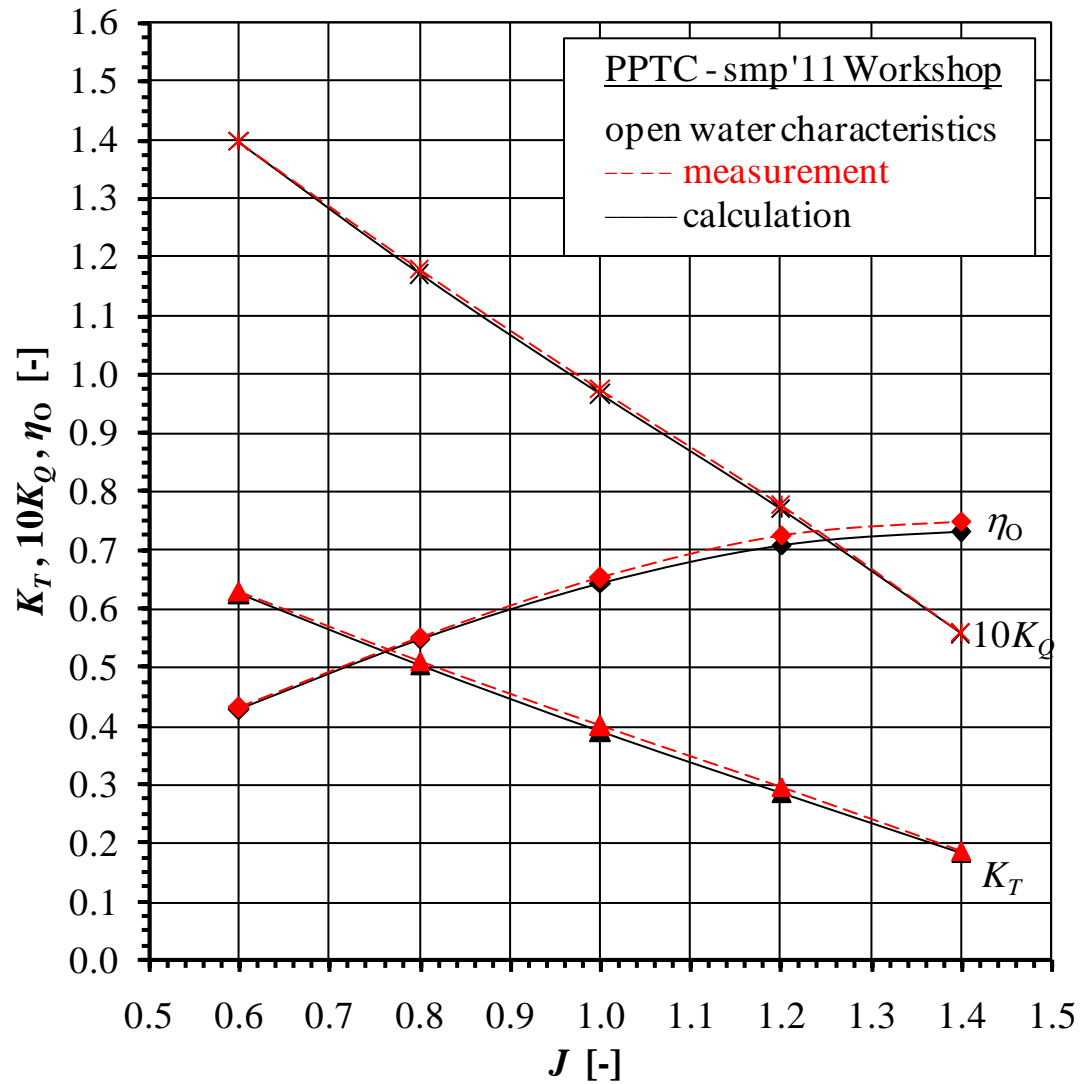
# HSVA QCM



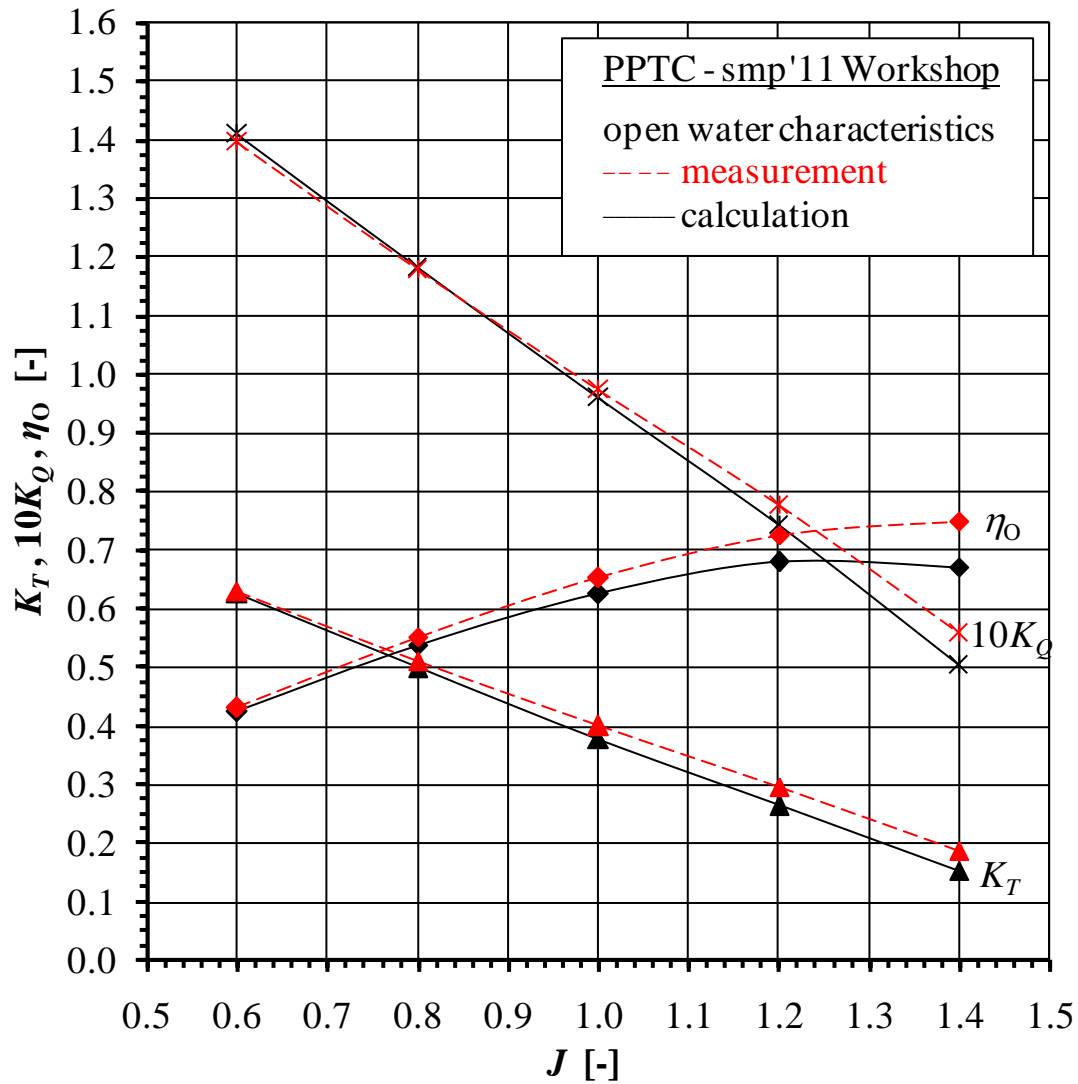
# INSEAN PFC



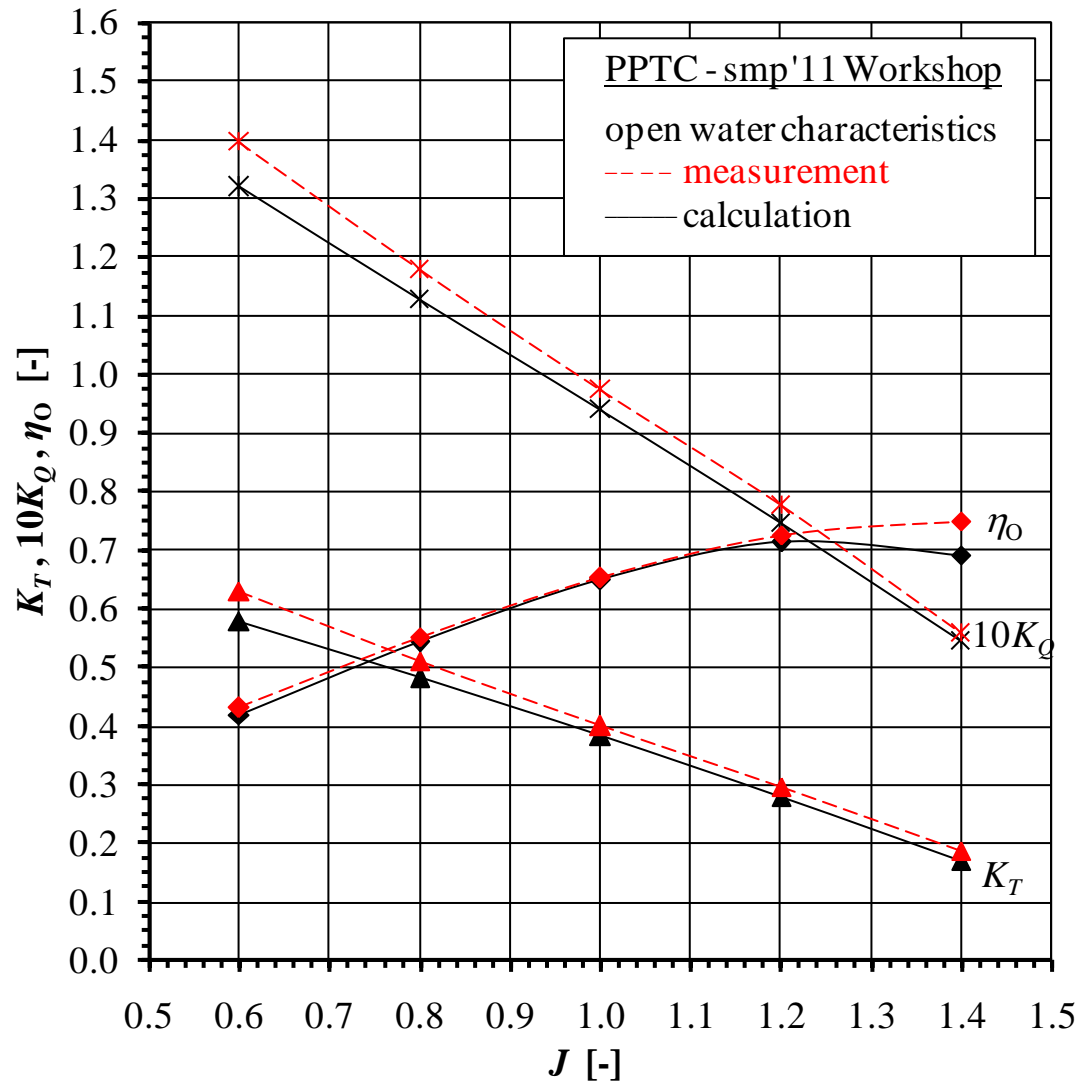
# MARIC ANSYS Fluent



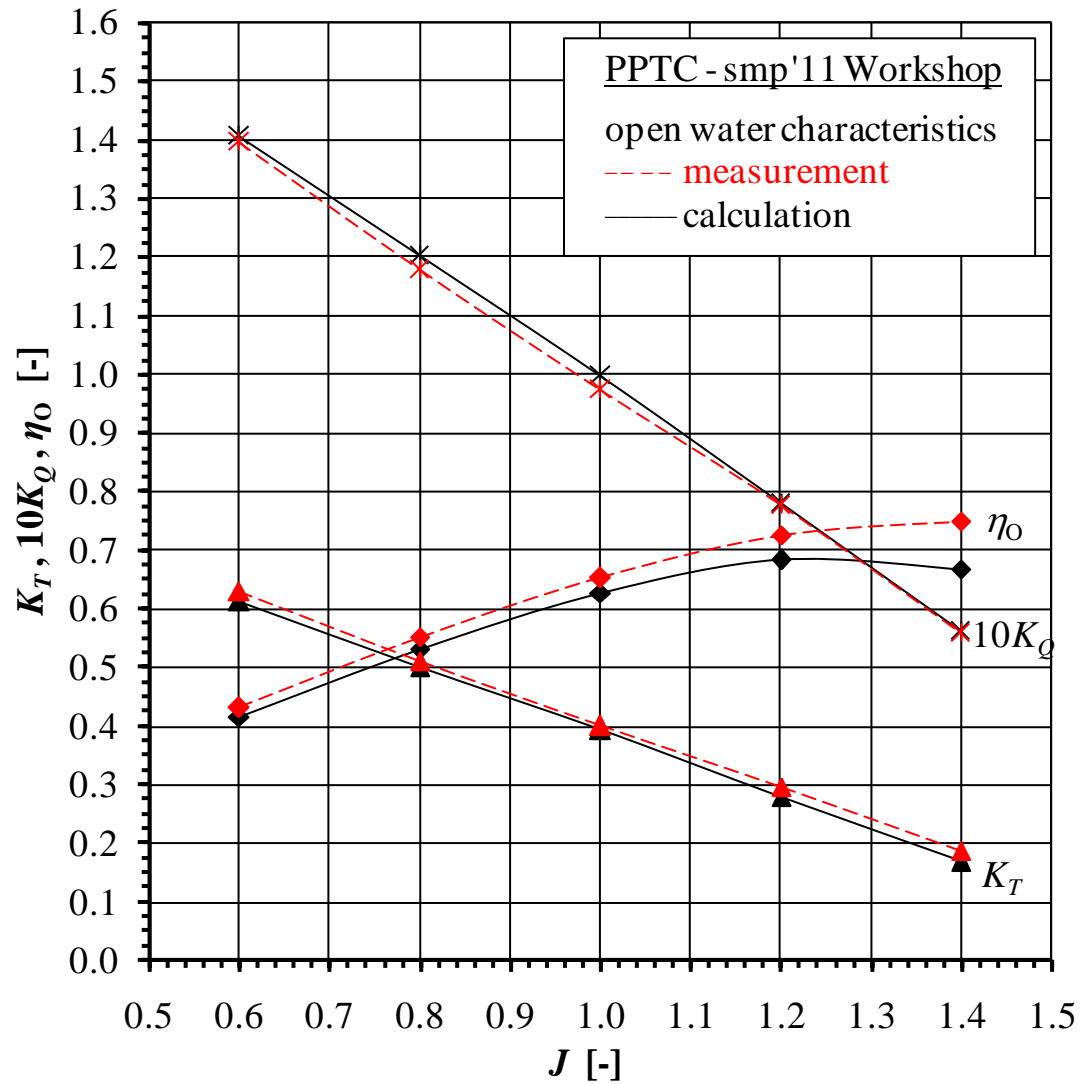
# SSPA ANSYS Fluent



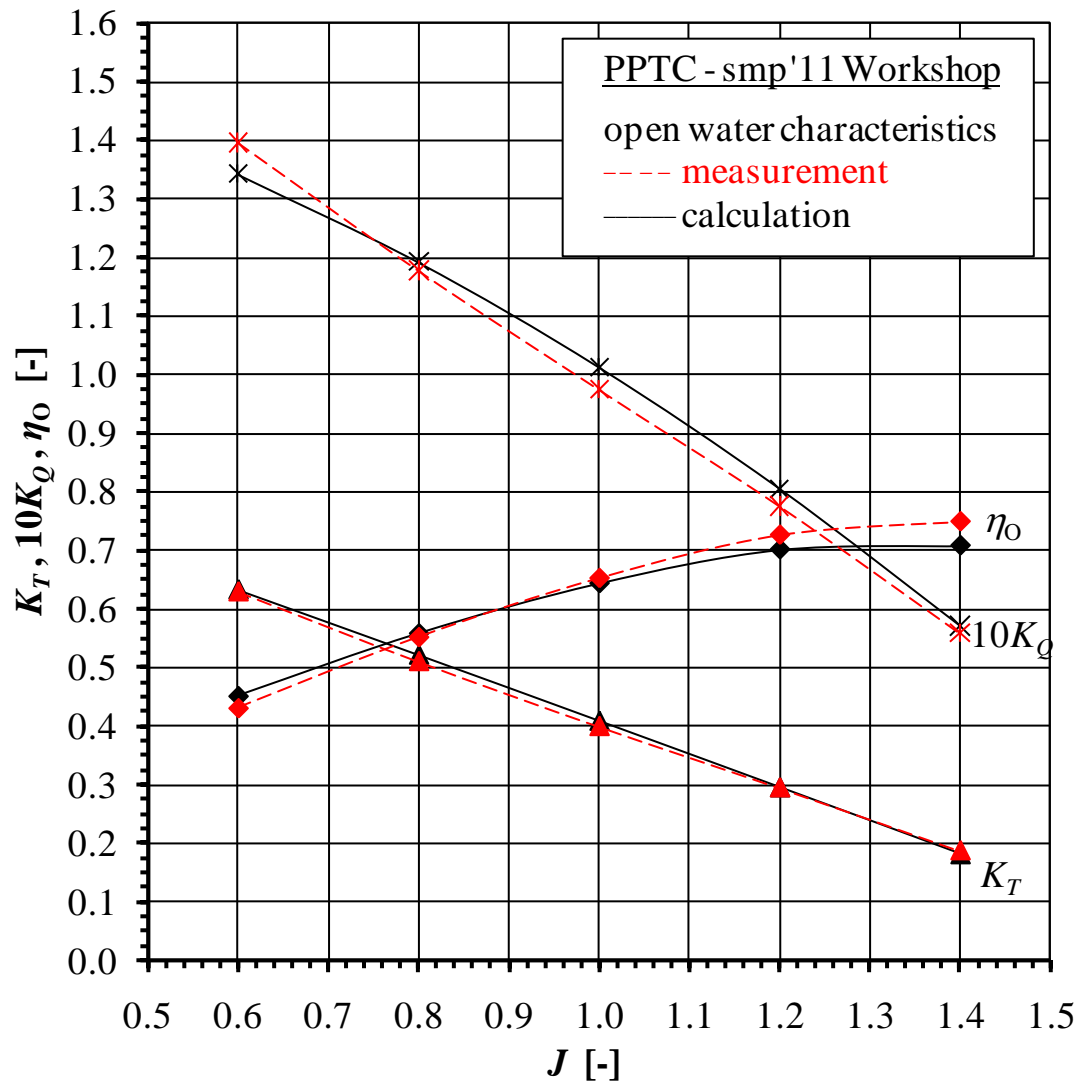
# SVA Vortex

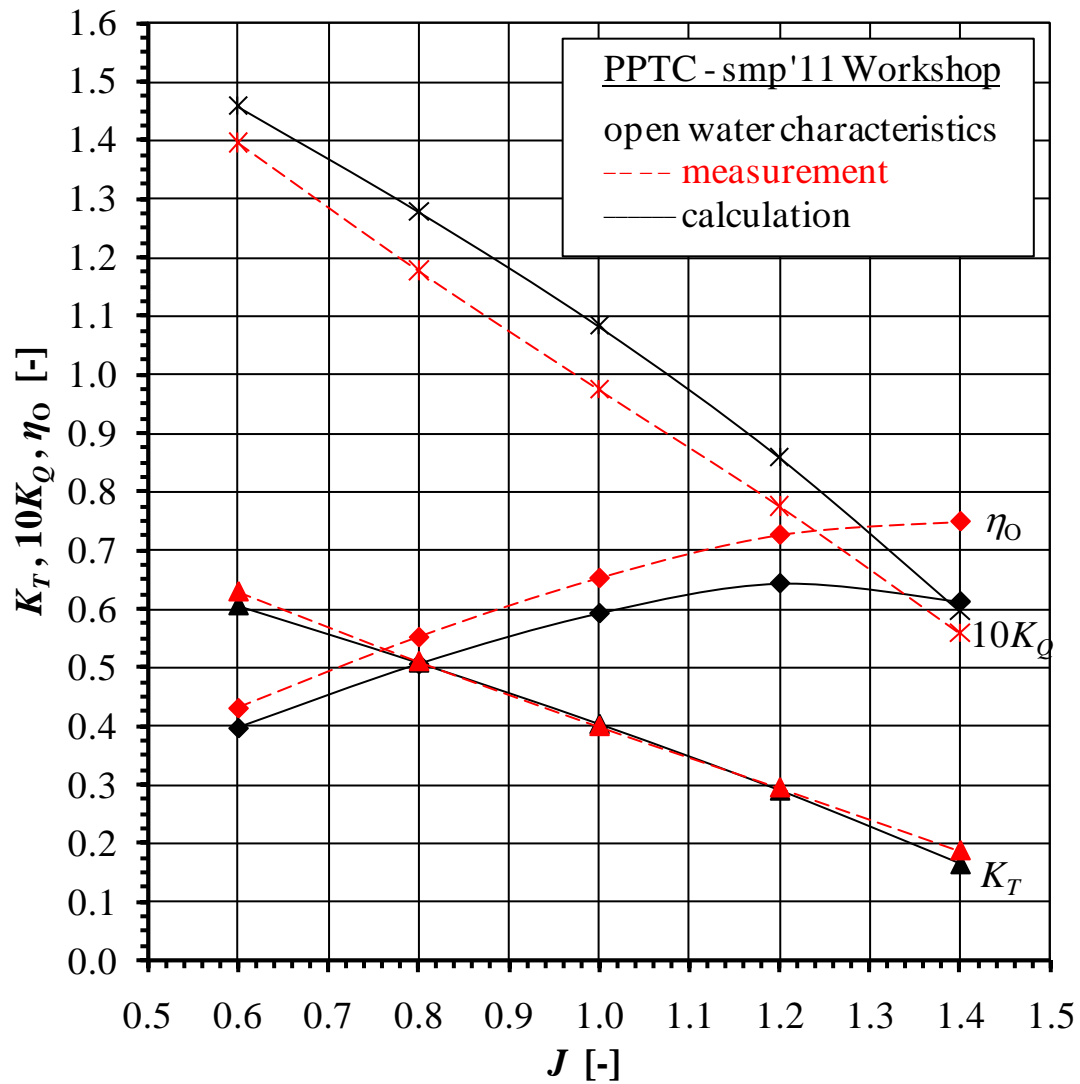




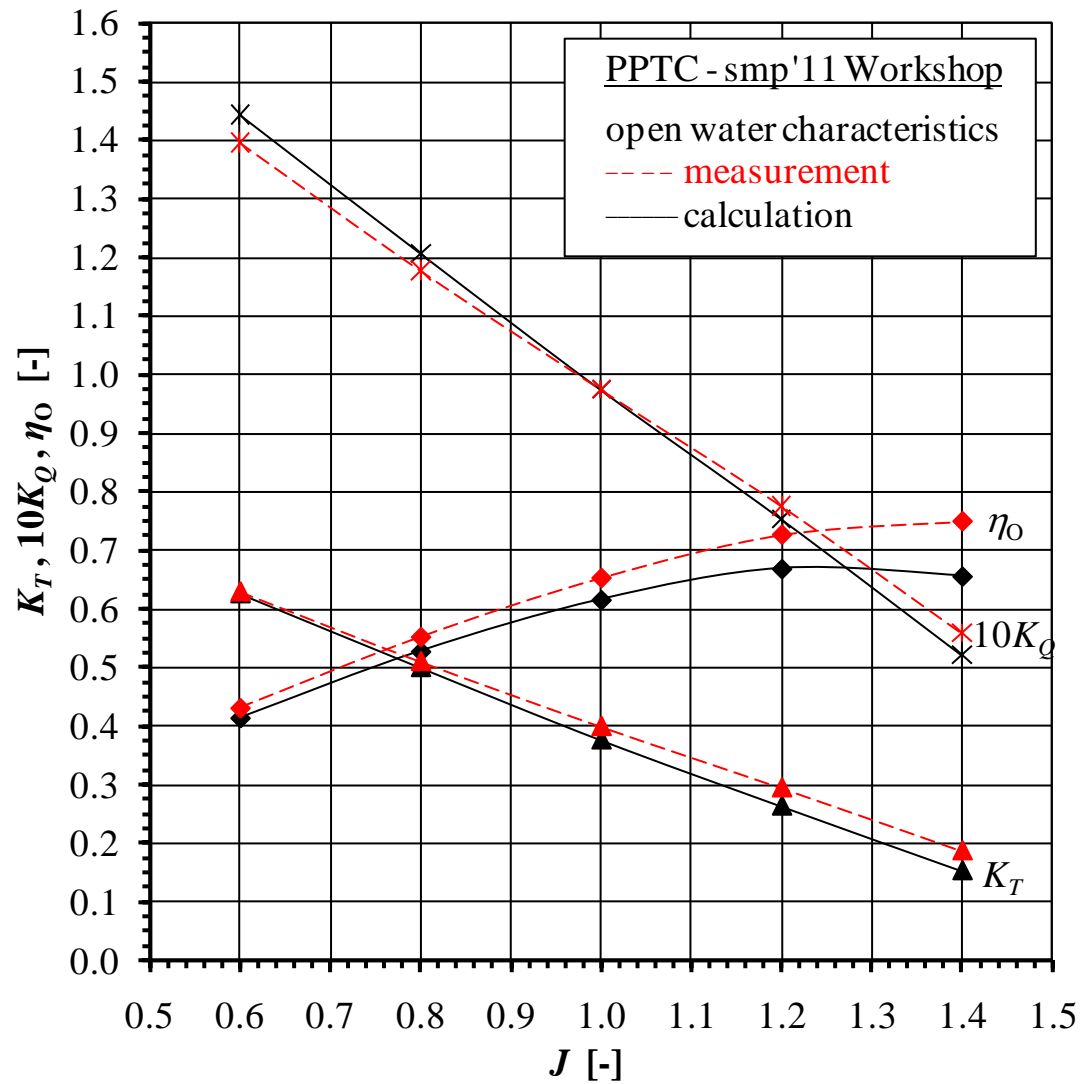


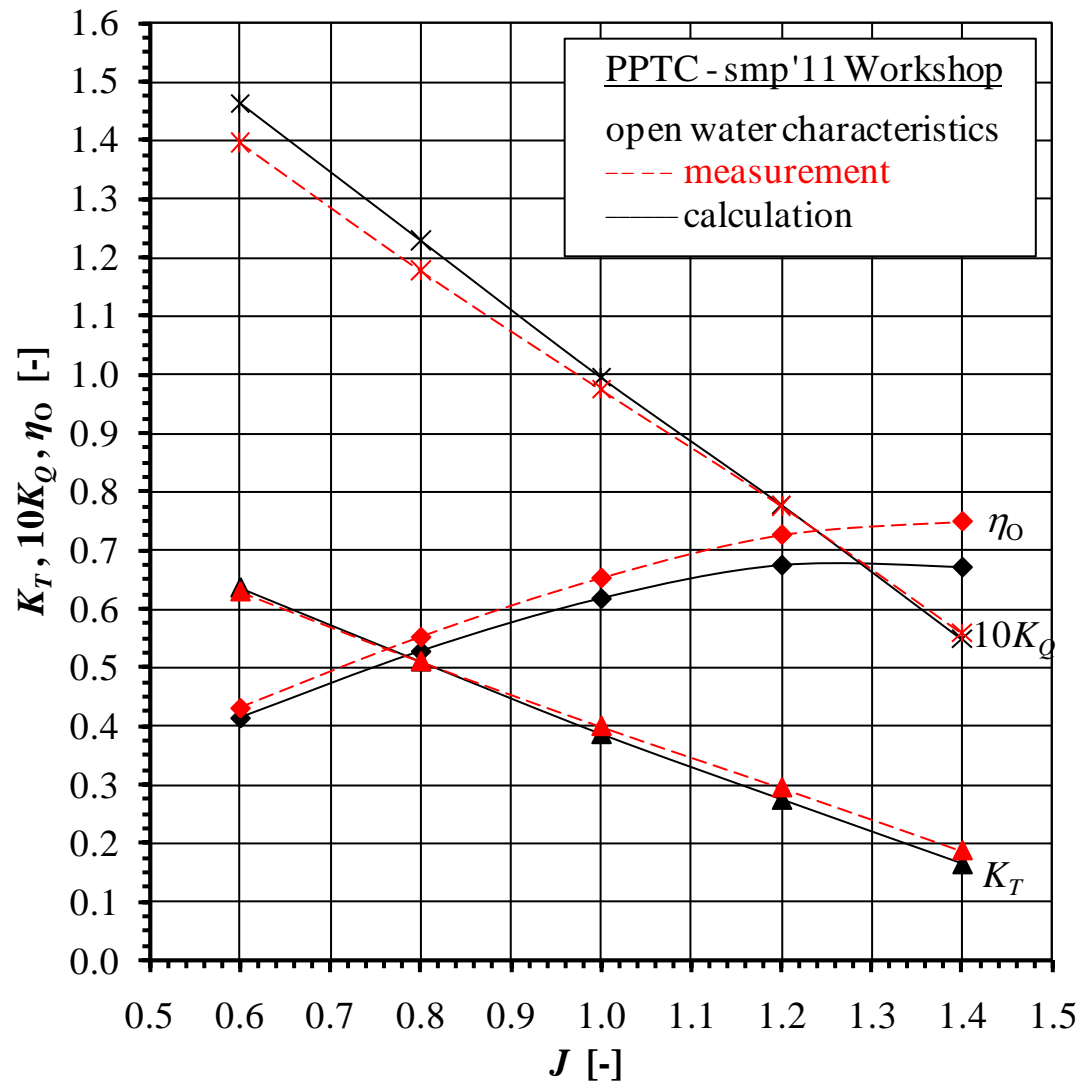
# University of Genua Panel

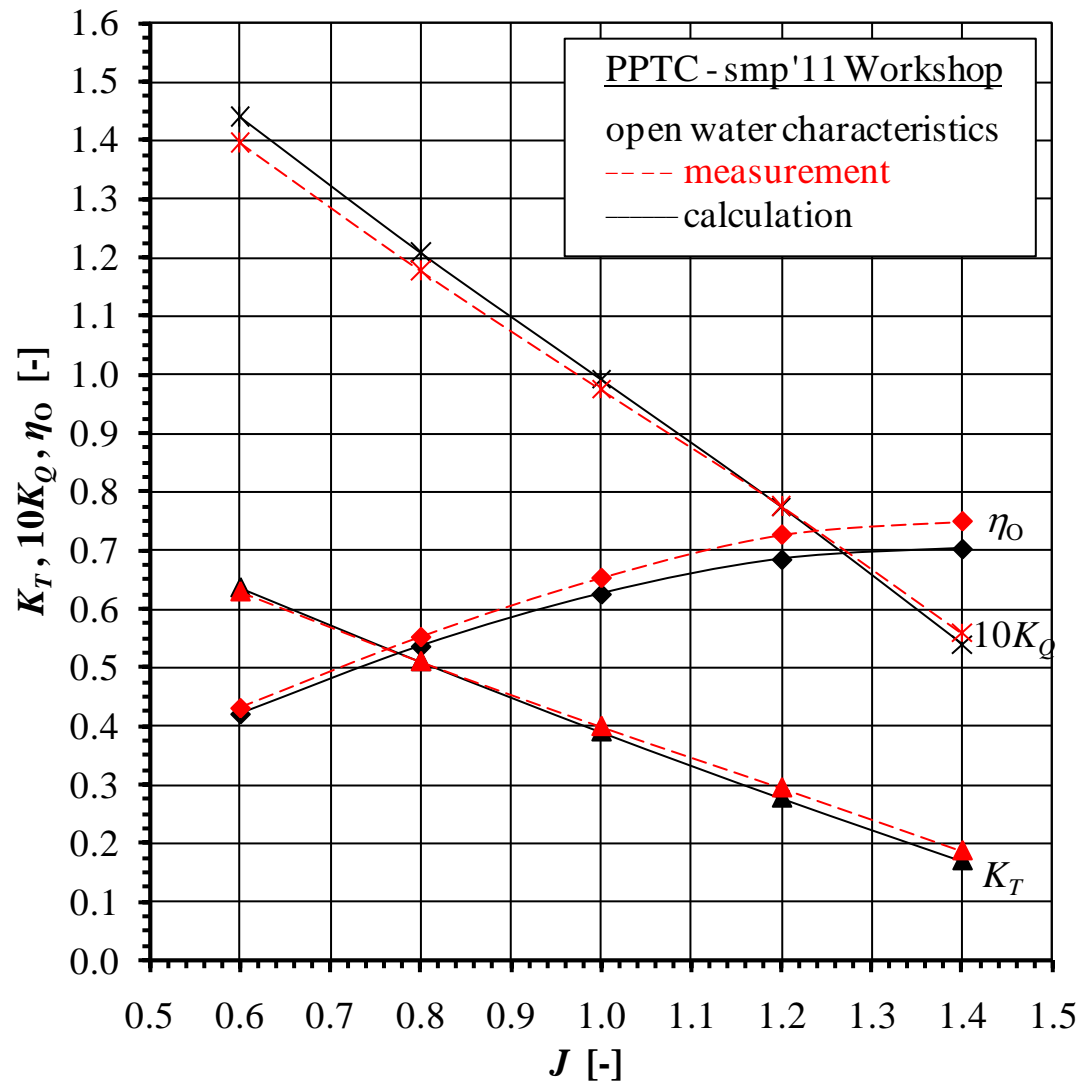




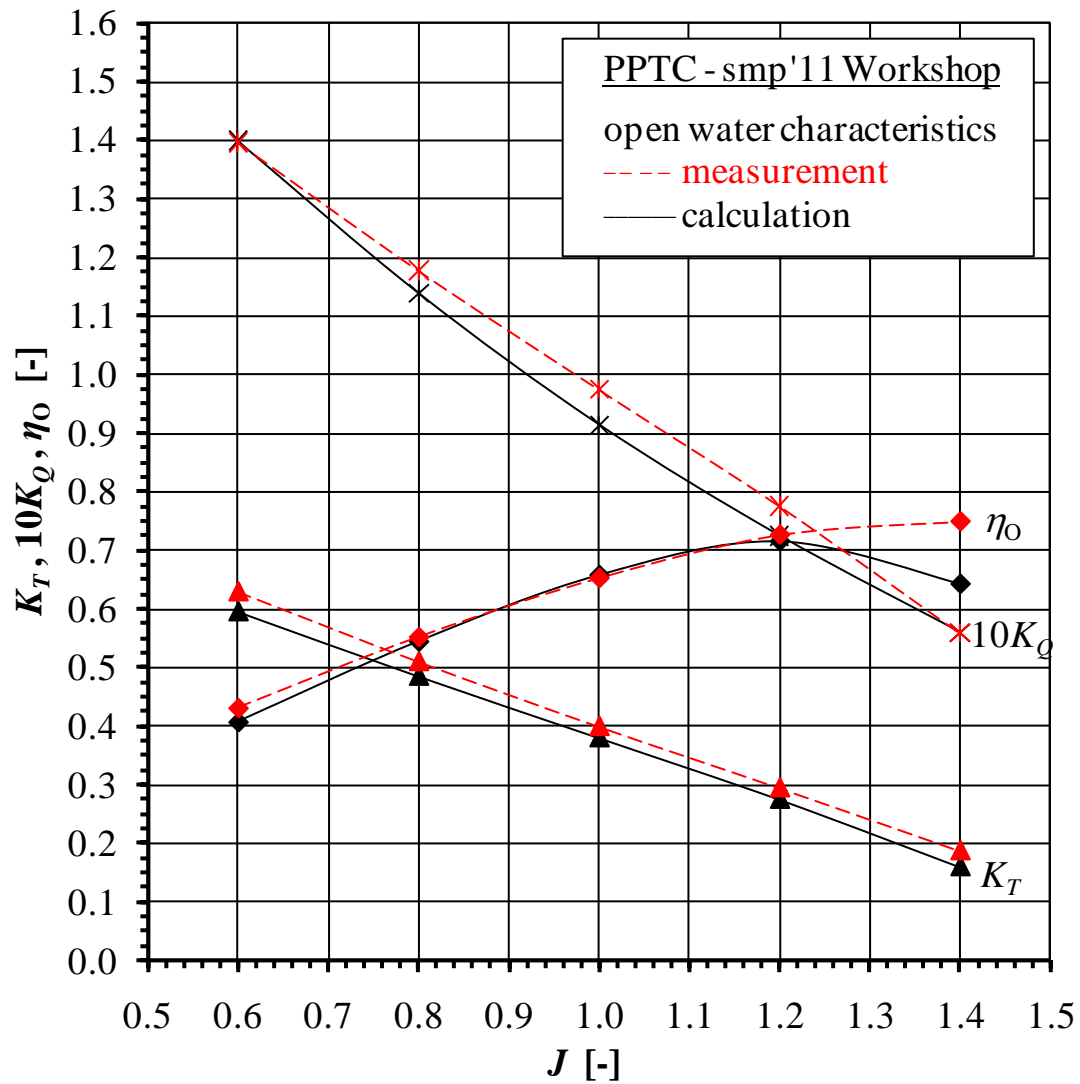
# University of Genua StarCCM+ ( $k\omega$ )





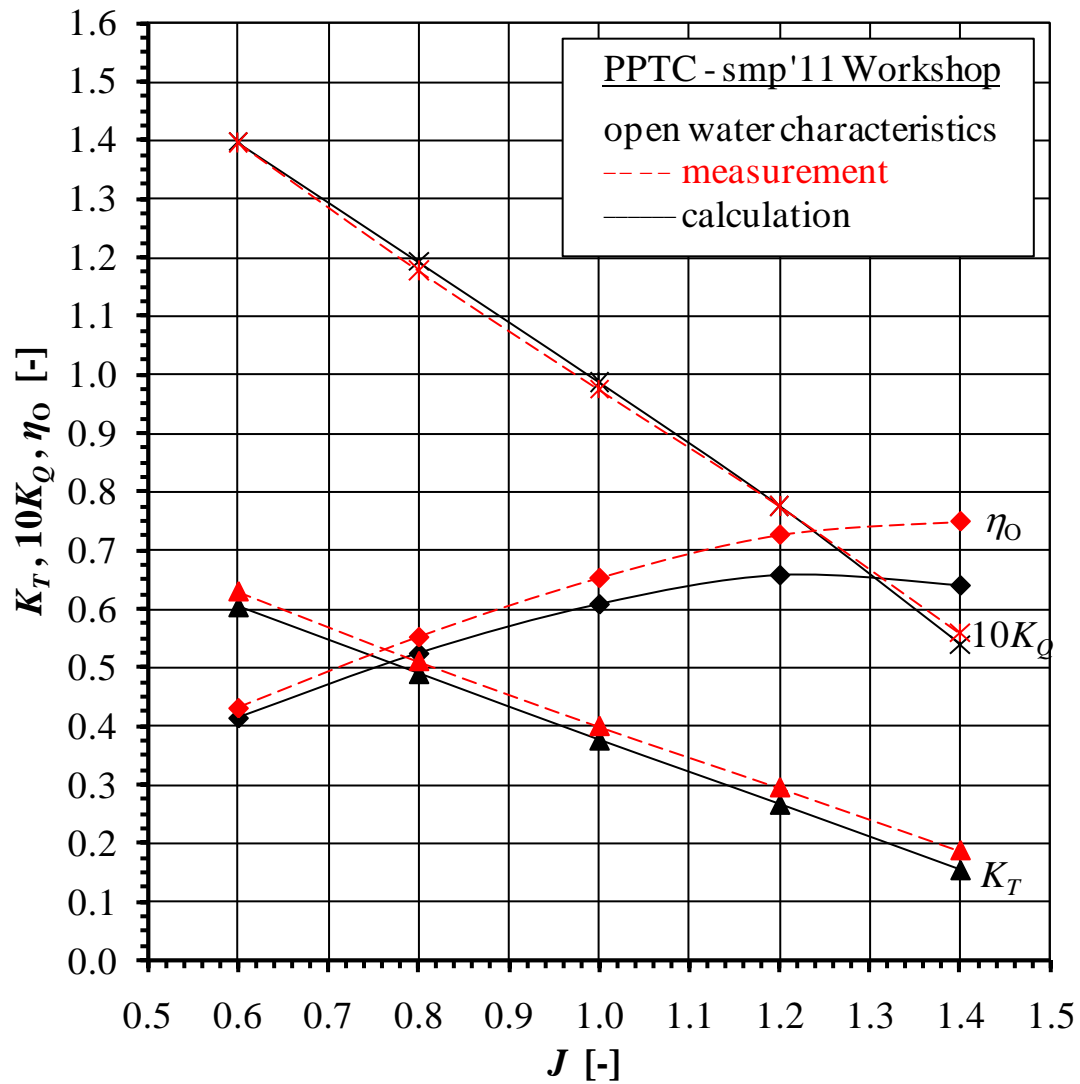


# VicusDT StarCCM+

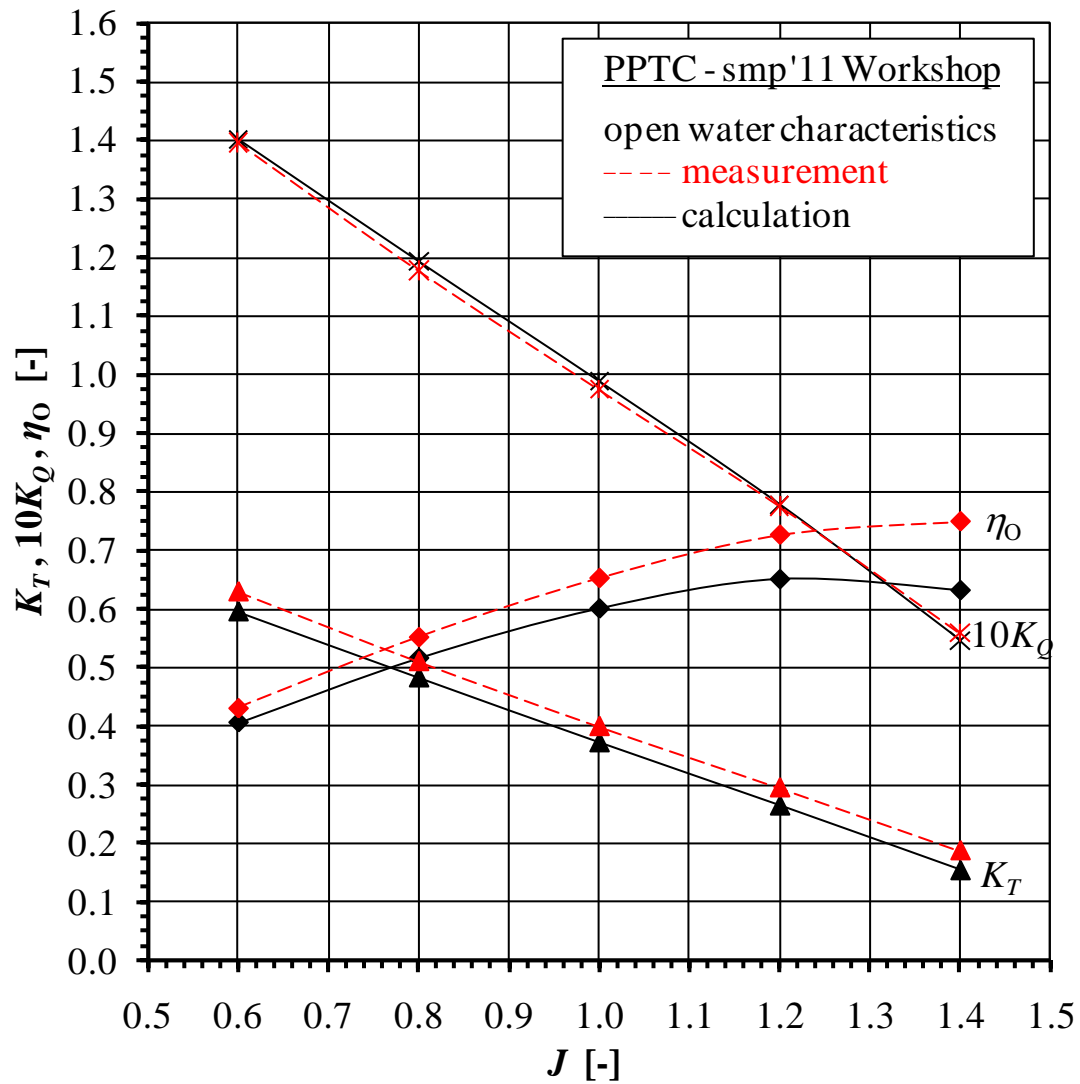




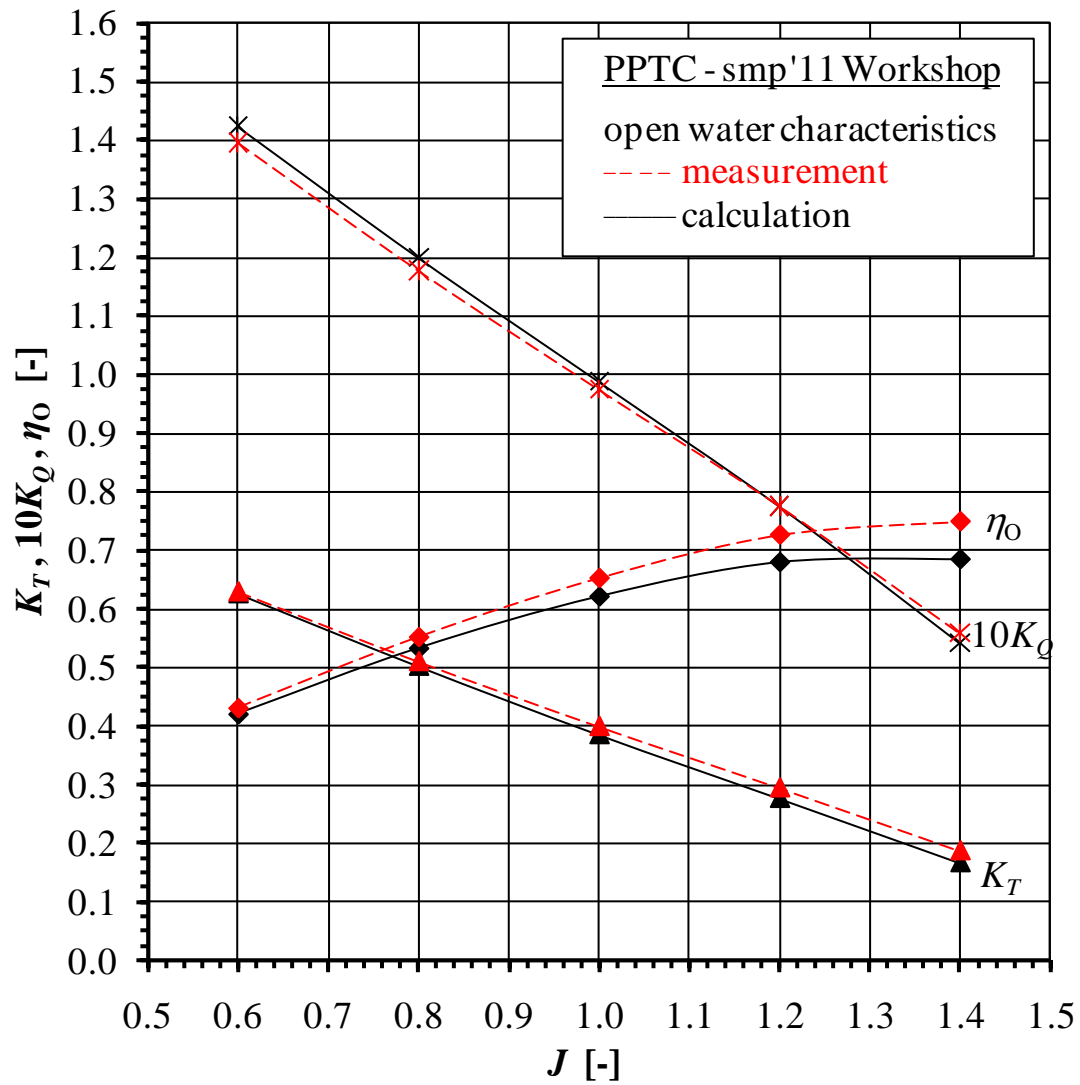
# VOITH Comet



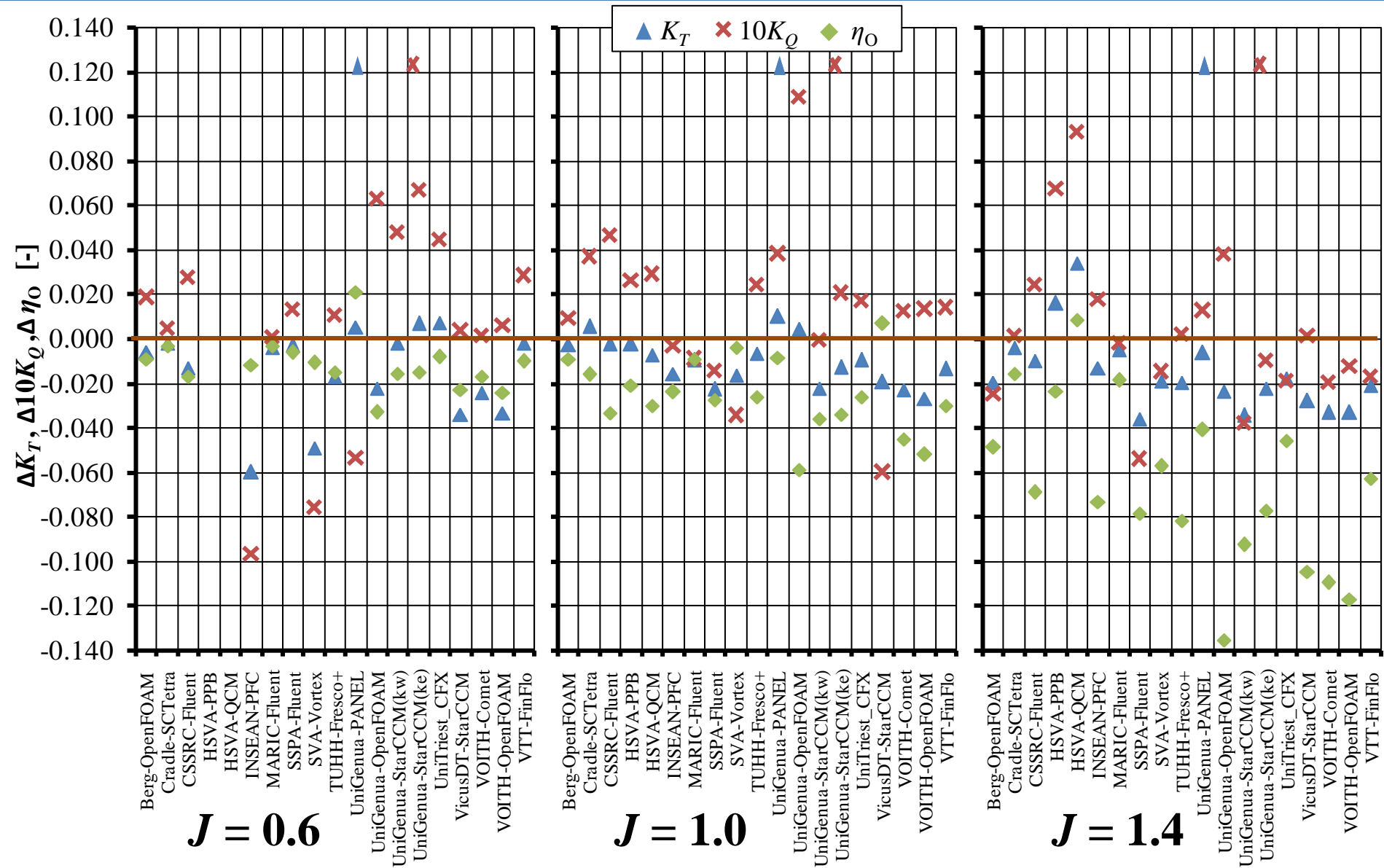
# VOITH OpenFOAM



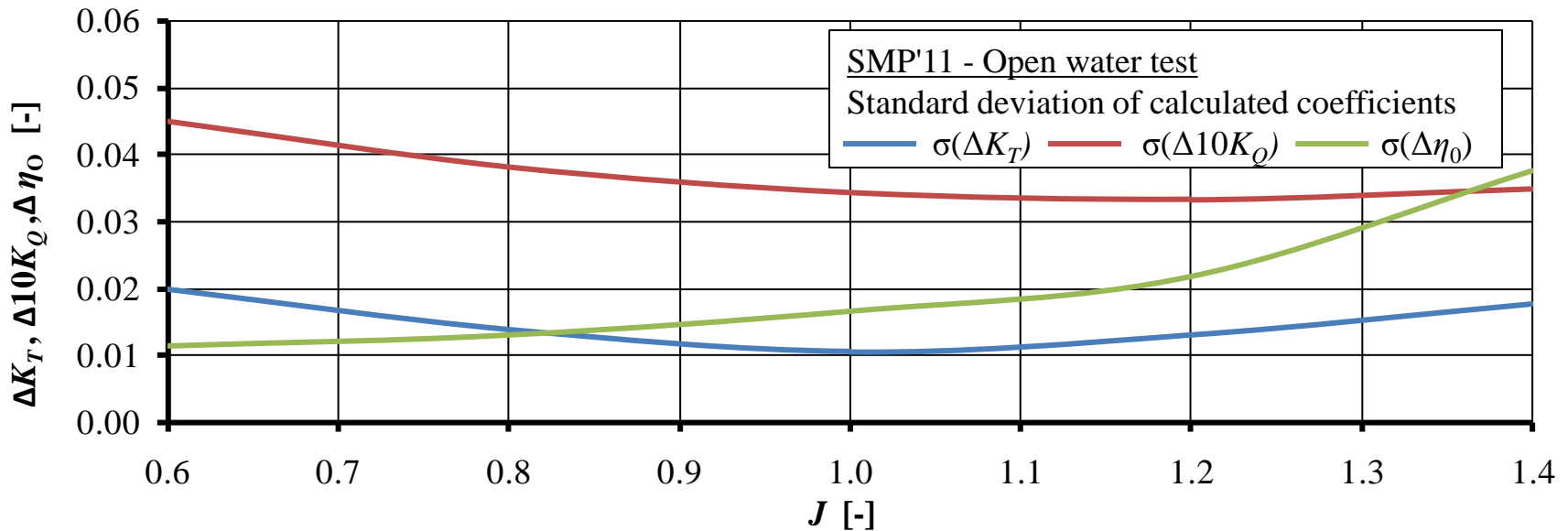
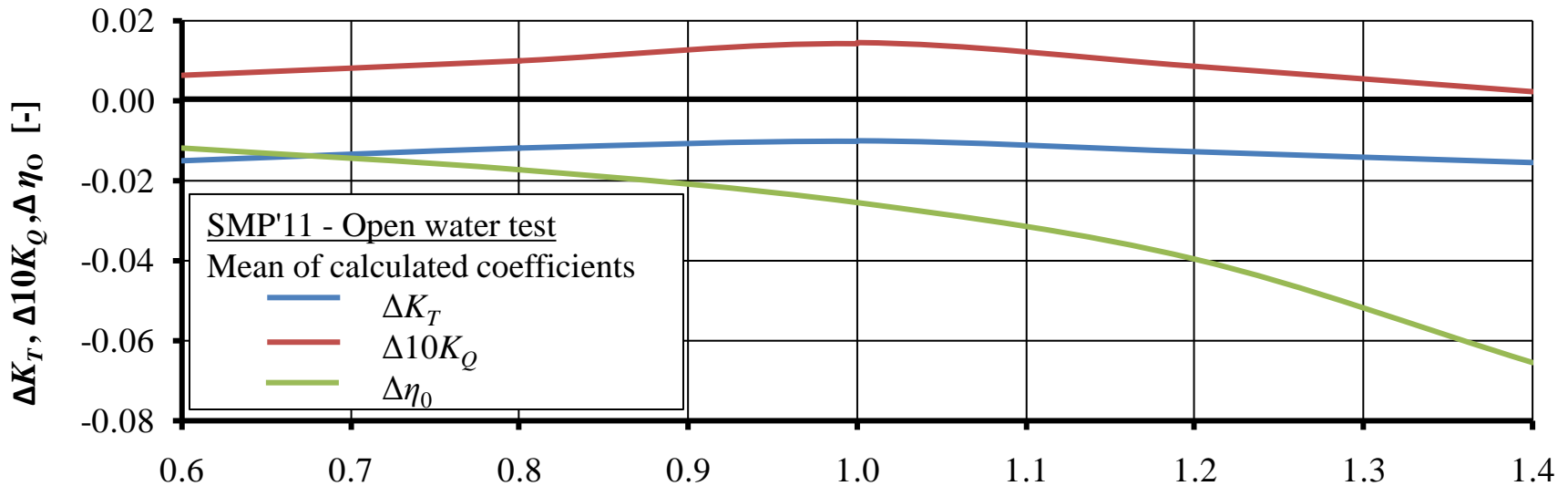
# VTT FinFlo



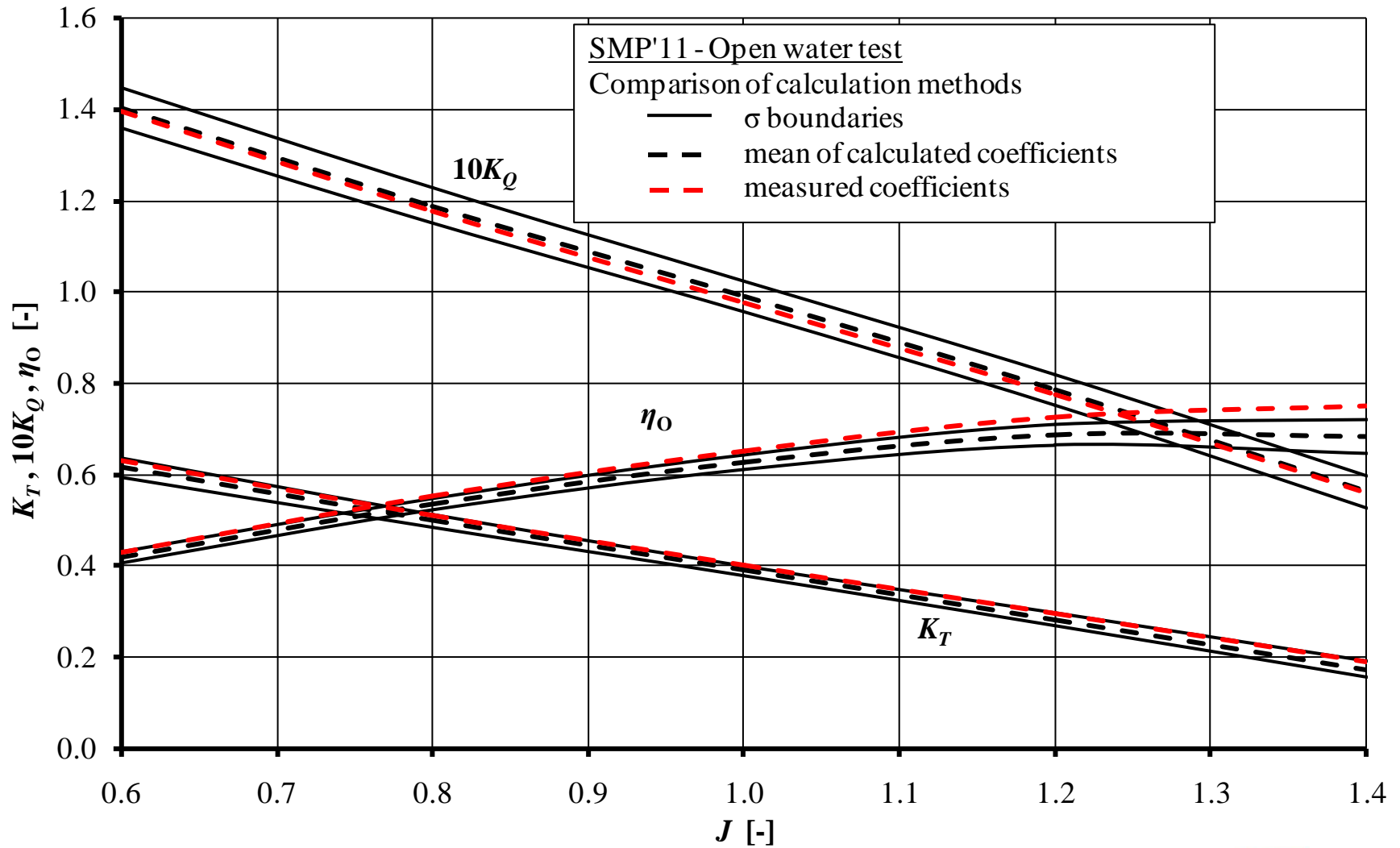
# Comparison - differences to the measurements



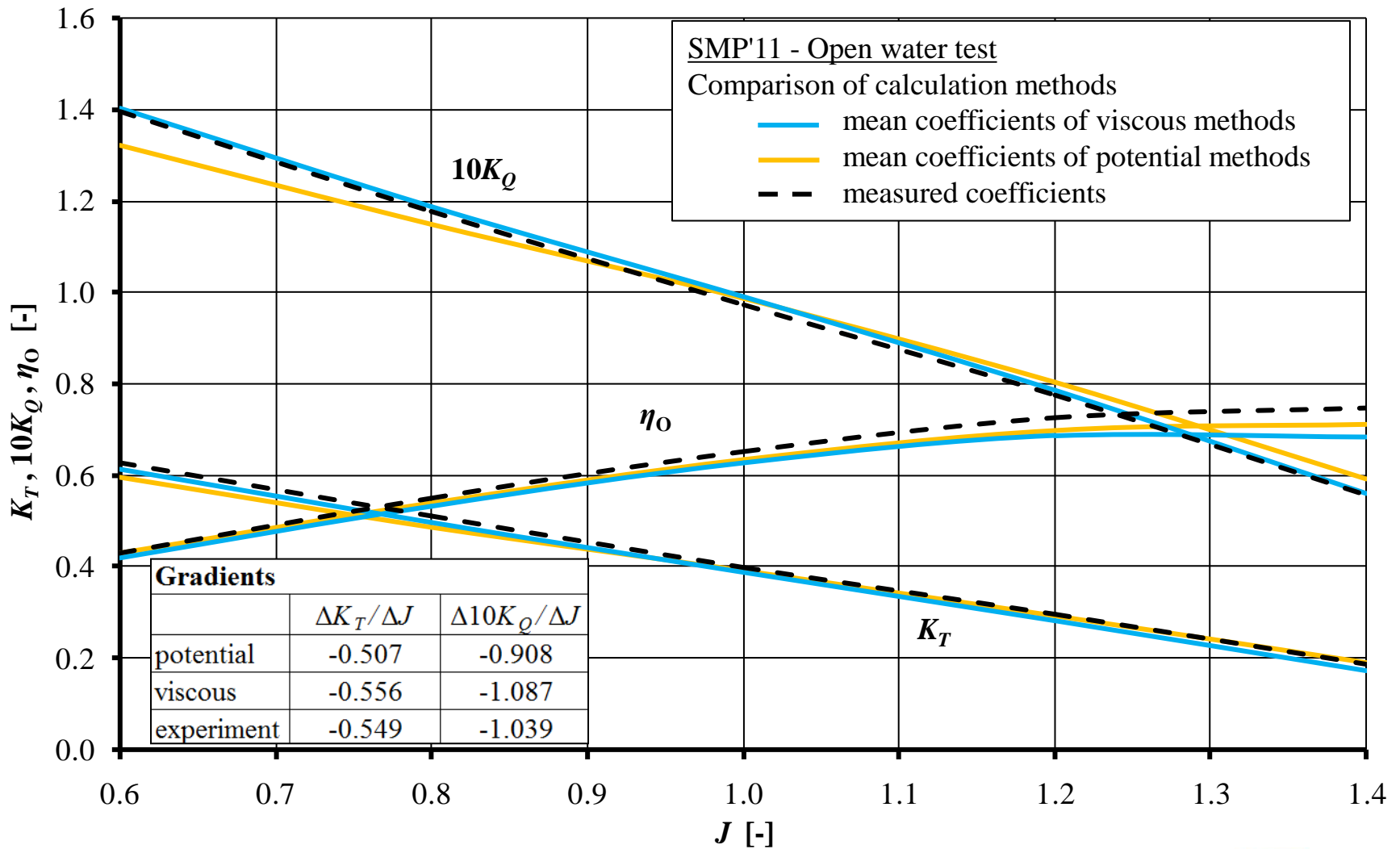
# Comparison - differences to the measurements



# Comparison - boundaries

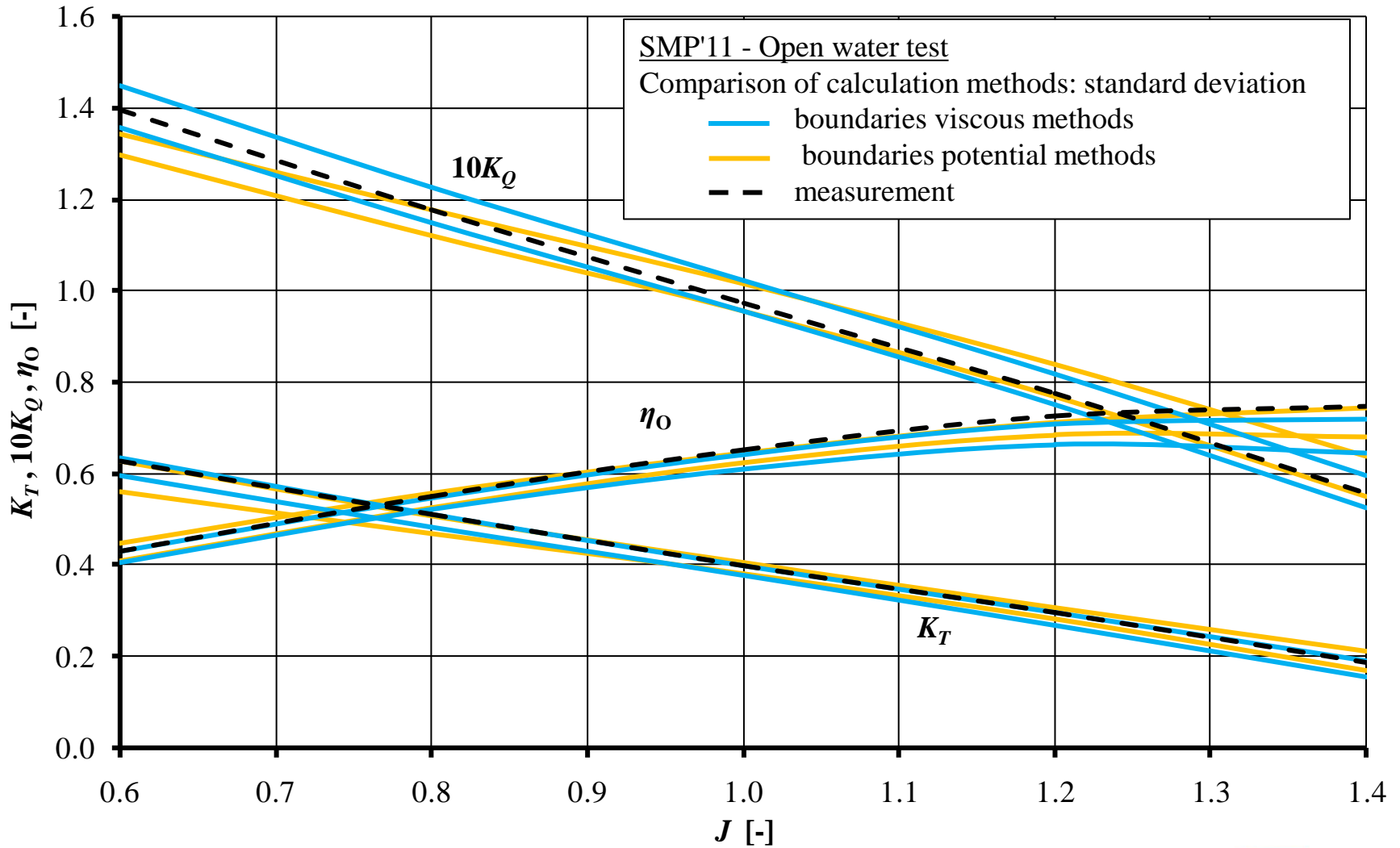


# Comparison - methods





# Comparison - methods



# Potsdam Propeller Test Case

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## 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.