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Property Libraries Software for Seawater,
Steam, Water, Ice, Humid Air, and other Working Fluids
for Calculating Desalination and Related Processes

Seawater

Library LibSeaWa

IAPWS Industrial Formulation 2013 (IAPWS Advisory Note No. 5)

• Water part from IAPWS-IF97

• Saline part from the IAPWS Scientific Formulation 2008 of Feistel

• Fichtner Handbook of H. E. Hoenig for extending the range of validity to 220 °C and 200 g salt / kg seawater

• Transport properties from Fichtner Handbook

Steam, Water, and Ice

Libraries LibIF97, LibICE

Industrial Formulation IAPWS-IF97 (Revision 2007)

• Supplementary Standards
IAPWS-IF97-S01
IAPWS-IF97-S03ref
IAPWS-IF97-S04
IAPWS-IF97-S05

• Ice from the IAPWS Formulation (2006)

• Melting and sublimation pressures from the IAPWS Formulation (2008)

Humid Air

**Library LibHuAir**

Model: Ideal mixture of the real fluids:

• Dry air from Lemmon et al. (2000)

• Steam, water, and ice from IAPWS-IF97 and IAPWS-06

Consideration of:

• Condensation and freezing of water vapor

• Dissociation from VDI-Guideline 4670 (2003)

• Poynting effect from ASHRAE RP-1485 (2009)

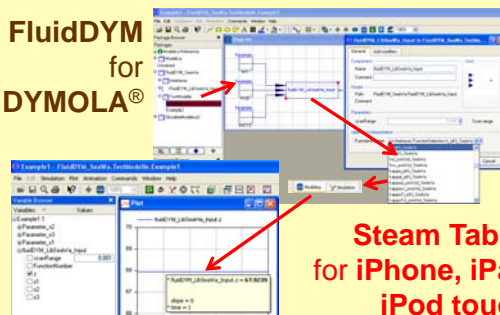### Humid Combustion Gases

Library LibHuGas

Model: Ideal mixture of the real fluids:

CO_2 - Span and Wagner (1994)
O_2 - Schmidt and Wagner (1995)
H_2O - IAPWS-95
Ar - Tegeler et al. (1999)
N_2 - Span (2000)

and of the ideal Gases:

SO_2, CO, Ne (Bücker et al., 2003)

Consideration of:

• Condensation of steam

• Dissociation and poynting effect
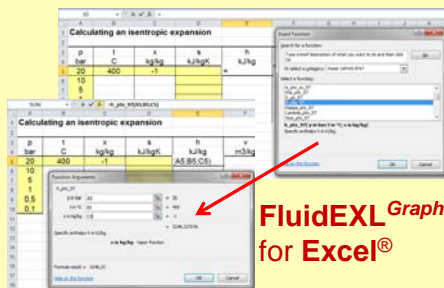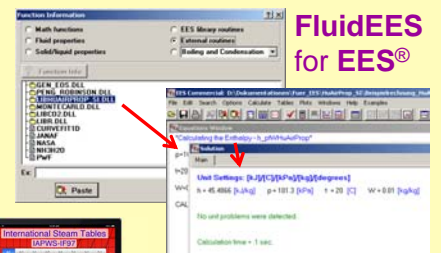

FluidEXL^{Graphics} **for Excel®**
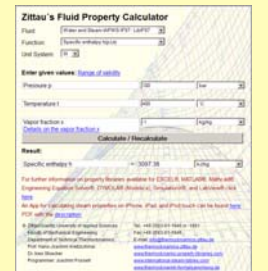
FluidDYM for DYMOLA®

FluidEES for EES®

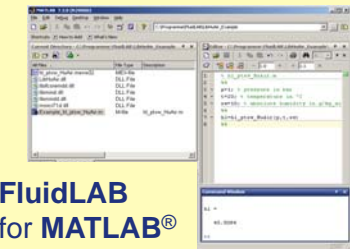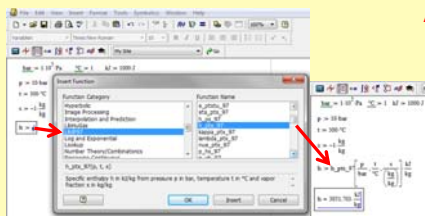**Steam Tables for iPhone, iPad, iPod touch, Android phones and tablets**

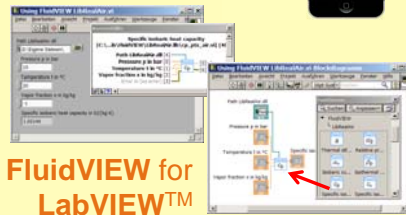**Online Property Calculator at**
www.thermodynamics-zittau.de

FluidLAB for MATLAB®

FluidMAT for Mathcad®

FluidVIEW for LabVIEW™

Ammonia / Water - Mixtures

Library LibAmWa

IAPWS Guideline 2001 of Tillner-Roth and Friend (1998)

Water / Lithium Bromide - Mixtures

Library LibWaLi

Formulation of Kim and Infante Ferreira (2004)

Carbon Dioxide including Dry Ice

Library LibCO2

Formulations of Span, Wagner, and Jaeger (1994, 2012)

Siloxanes as Working Fluids for ORC Processes

$C_8H_{24}O_4Si_4$
Octamethylcyclotetrasiloxane
Library LibD4

$C_{10}H_{30}O_5Si_5$
Decamethylcyclopentasiloxane
Library LibD5

$C_{14}H_{42}O_5Si_6$
Tetradecamethylhexasiloxane
Library LibMD4M

$C_6H_{18}OSi_2$
Hexamethyldisiloxane
Library LibMM

Formulation of Colonna et al. (2006)
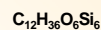
$C_{12}H_{36}O_6Si_6$
Dodecamethylcyclohexasiloxane
Library LibD6
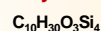
$C_{10}H_{30}O_3Si_4$
Decamethyltetrasiloxane
Library LibMD2M
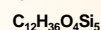
$C_{12}H_{36}O_4Si_5$
Dodecamethylpentasiloxane
Library LibMD3M
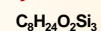
$C_8H_{24}O_2Si_3$
Octamethyltrisiloxane
Library LibMDM

Formulation of Colonna et al. (2008)

Liquid Coolants

Library LibSecRef

Liquid solutions of water with:

$C_2H_6O_2$	Ethylene glycol
$C_3H_8O_2$	Propylene glycol
C_2H_5OH	Ethyl alcohol
CH_3OH	Methyl alcohol
$C_3H_8O_3$	Glycerol
K_2CO_3	Potassium carbonate
$CaCl_2$	Calcium chloride
$MgCl_2$	Magnesium chloride
NaCl	Sodium chloride
$C_2H_3KO_2$	Potassium acetate

Formulation of the International Institute of Refrigeration (1997)

Ethanol

Library LibC2H5OH

Formulation of Schroeder et al. (2012)

Ammonia

Library LibNH3

Formulation of Tillner-Roth (1995)

R134a

Library LibR134a

Formulation of Tillner-Roth and Baehr (1994)

www.thermodynamic-property-libraries.com