INSTITUT FÜR SOLARTECHNIK

HSR HOCHSCHULE FÜR TECHNIK RAPPERSWIL
FHO Fachhochschule Ostschweiz

Type977 fitting for heat pump SIN-18TU

Parametric Heat Pump calculation

Dani Carbonell
dani.carbonell@spf.ch

2019/03/12 at: 16:07:54 h

Table 1: Fitted coefficients for the heat pump.

Coefficient	Description	
		$[kW]$
P_{Q_1}	1^{st} *condenser polynomial coefficient*	1.6031e+01
P_{Q_2}	2^{st} *condenser polynomial coefficient*	1.6862e+02
P_{Q_3}	3^{st} *condenser polynomial coefficient*	4.5006e+01
P_{Q_4}	4^{st} *condenser polynomial coefficient*	-3.0845e+02
P_{Q_5}	5^{st} *condenser polynomial coefficient*	2.7295e+02
P_{Q_6}	6^{st} *condenser polynomial coefficient*	-1.9880e+02
P_{COP_1}	1^{st} *COP polynomial coefficient*	6.0450e+00
P_{COP_2}	2^{st} *COP polynomial coefficient*	5.1596e+01
P_{COP_3}	3^{st} *COP polynomial coefficient*	4.8630e-01
P_{COP_4}	4^{st} *COP polynomial coefficient*	-1.9286e+02
P_{COP_5}	5^{st} *COP polynomial coefficient*	-2.0545e+01
P_{COP_6}	6^{st} *COP polynomial coefficient*	-8.4732e+01
$\dot{m}_{cond}$	3000.00 $[kg/h]$	
$\dot{m}_{evap}$	3000.00 $[kg/h]$	
COP_{nom} (A0W35)	4.64	
$Q_{cond,nom}$ (A0W35)	17.39 $[kW]$	
$Q_{evap,nom}$ (A0W35)	13.64 $[kW]$	
$W_{comp,nom}$ (A0W35)	3.75 $[kW]$	
RMS_{COP}	$4.63e-02$	
$RMS_{Q_{cond}}$	$1.09e-01$	
$RMS_{W_{comp}}$	$5.19e-02$	
Fit model	Average Temperature	

Table 2: Differences between experiments and fitted data for the heat pump. $error = 100 \cdot |\frac{Q_{exp}-Q_{num}}{Q_{exp}}|$ and $RMS = \sqrt{\sum \frac{(Q_{exp}-Q_{num})^2}{n_p}}$ where n_p is the number of data points.

$T_{cond,out}$ ^oC	$T_{evap,in}$ ^oC	COP [–]	COP_{exp} [–]	error [%]	Q_{cond} $[kW]$	$Q_{cond,exp}$ $[kW]$	error [%]	W_{comp} $[kW]$	$W_{comp,exp}$ $[kW]$	error [%]
35.00	-5.00	4.16	4.10	1.5	15.44	15.40	0.3	3.72	3.76	1.18
35.00	0.00	4.67	4.70	0.6	17.54	17.50	0.2	3.75	3.72	0.87
35.00	5.00	5.19	5.22	0.5	19.80	19.90	0.5	3.81	3.81	0.01
50.00	-5.00	3.10	3.13	1.0	15.20	15.47	1.7	4.91	4.95	0.71
50.00	0.00	3.43	3.34	2.5	17.05	16.83	1.3	4.97	5.03	1.20
50.00	5.00	3.78	3.70	1.9	19.07	19.07	0.0	5.05	5.15	1.88
45.00	-5.00	3.50	3.55	1.2	15.40	15.43	0.2	4.40	4.35	1.03
45.00	0.00	3.90	3.92	0.5	17.34	17.17	1.0	4.44	4.38	1.50
45.00	5.00	4.31	4.35	0.9	19.44	19.48	0.2	4.51	4.48	0.70
55.00	0.00	2.90	2.90	0.0	16.64	16.50	0.9	5.74	5.69	0.92
55.00	5.00	3.19	3.21	0.6	18.59	18.65	0.3	5.83	5.82	0.30
35.00	10.00	5.70	5.70	0.1	22.22	22.30	0.4	3.90	3.91	0.29
35.00	15.00	6.20	6.17	0.5	24.80	24.70	0.4	4.00	4.00	0.13
50.00	10.00	4.12	4.05	1.7	21.26	21.30	0.2	5.17	5.26	1.84
50.00	15.00	4.45	4.38	1.6	23.60	23.53	0.3	5.31	5.38	1.28
45.00	10.00	4.70	4.75	1.0	21.70	21.80	0.4	4.61	4.59	0.57
45.00	15.00	5.09	5.14	0.9	24.12	24.12	0.0	4.74	4.69	0.95
55.00	10.00	3.47	3.50	1.0	20.70	20.80	0.5	5.97	5.94	0.48
55.00	15.00	3.74	3.78	1.2	22.97	22.95	0.1	6.14	6.07	1.27
Sum				19.2			8.9			17.10
RMS_{COP}	$4.63e-02$									
$RMS_{Q_{cond}}$	$1.09e-01$									
$RMS_{W_{comp}}$	$5.19e-02$									

Meier/SIN-18TU/SIN-18TU-Qcond.pdf

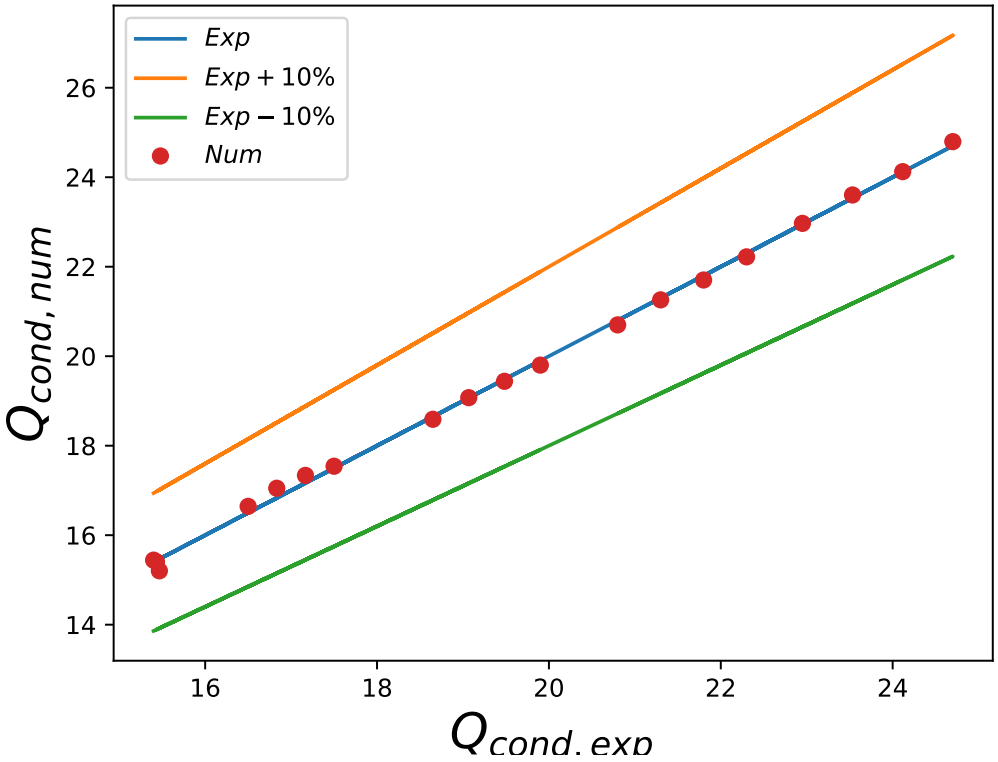

Figure 1: Q_{cond} differences between experiments and fitted data

Meier/SIN-18TU/SIN-18TU-Qcomp.pdf

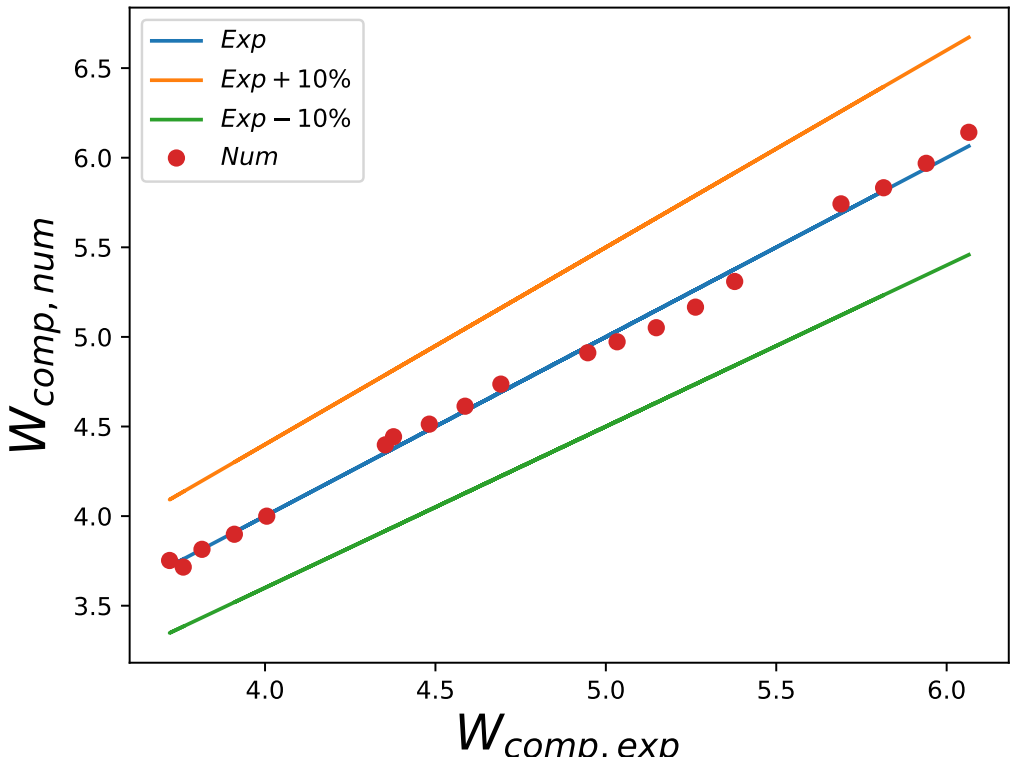

Figure 2: W_{comp} differences between experiments and fitted data

Meier/SIN-18TU/SIN-18TU-COP.pdf

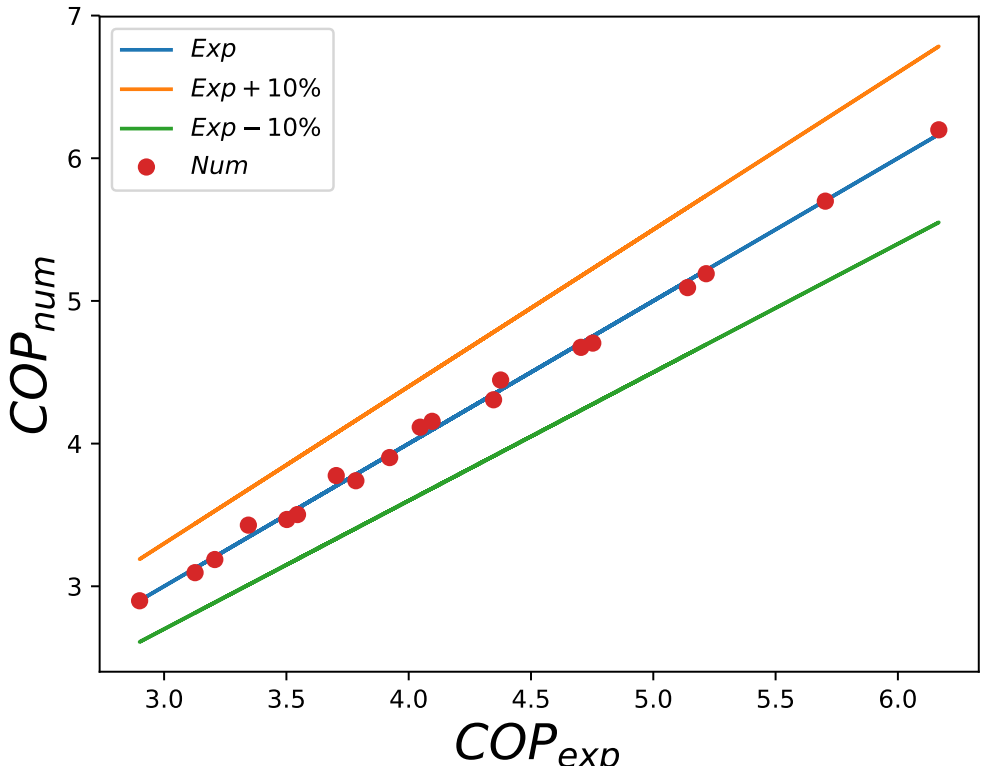

Figure 3: *COP* differences between experiments and fitted data