INSTITUT FÜR SOLARTECHNIK

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Type977 fitting for heat pump SIN-50TU

Parametric Heat Pump calculation

Dani Carbonell
dani.carbonell@spf.ch

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Table 1: Fitted coefficients for the heat pump.

Coefficient	Description	$[kW]$
P_{Q_1}	1^{st} *condenser polynomial coefficient*	4.5713e+01
P_{Q_2}	2^{st} *condenser polynomial coefficient*	5.3253e+02
P_{Q_3}	3^{st} *condenser polynomial coefficient*	2.1462e+02
P_{Q_4}	4^{st} *condenser polynomial coefficient*	-6.8035e+02
P_{Q_5}	5^{st} *condenser polynomial coefficient*	7.1420e+02
P_{Q_6}	6^{st} *condenser polynomial coefficient*	-1.0875e+03
P_{COP_1}	1^{st} *COP polynomial coefficient*	6.5443e+00
P_{COP_2}	2^{st} *COP polynomial coefficient*	6.2672e+01
P_{COP_3}	3^{st} *COP polynomial coefficient*	3.1491e+00
P_{COP_4}	4^{st} *COP polynomial coefficient*	-1.6528e+02
P_{COP_5}	5^{st} *COP polynomial coefficient*	1.7388e+02
P_{COP_6}	6^{st} *COP polynomial coefficient*	-1.1522e+02
$\dot{m}_{cond}$	8800.00 $[kg/h]$	
$\dot{m}_{evap}$	8800.00 $[kg/h]$	
COP_{nom} (A0W35)	4.91	
$Q_{cond,nom}$ (A0W35)	51.78 $[kW]$	
$Q_{evap,nom}$ (A0W35)	41.23 $[kW]$	
$W_{comp,nom}$ (A0W35)	10.55 $[kW]$	
RMS_{COP}	$5.59e-02$	
$RMS_{Q_{cond}}$	$2.58e-01$	
$RMS_{W_{comp}}$	$1.39e-01$	
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	4.30	4.30	0.1	44.95	44.90	0.1	10.46	10.44	0.22
35.00	0.00	4.95	4.90	1.0	52.21	52.00	0.4	10.55	10.61	0.59
35.00	5.00	5.71	5.74	0.5	59.87	60.05	0.3	10.48	10.46	0.16
50.00	-5.00	2.85	2.86	0.5	40.56	40.97	1.0	14.24	14.31	0.53
50.00	0.00	3.36	3.24	3.7	47.33	46.73	1.3	14.08	14.42	2.37
50.00	5.00	4.00	3.93	1.8	54.57	54.45	0.2	13.66	13.87	1.50
45.00	-5.00	3.41	3.47	1.7	42.70	42.93	0.5	12.52	12.38	1.17
45.00	0.00	3.97	3.94	0.7	49.66	49.37	0.6	12.50	12.52	0.13
45.00	5.00	4.65	4.71	1.2	57.05	57.25	0.4	12.27	12.16	0.84
55.00	0.00	2.68	2.70	0.9	44.35	44.10	0.6	16.57	16.33	1.47
55.00	5.00	3.27	3.32	1.5	51.44	51.65	0.4	15.73	15.56	1.08
35.00	10.00	6.57	6.60	0.4	67.92	68.10	0.3	10.33	10.32	0.12
35.00	15.00	7.53	7.48	0.6	76.34	76.15	0.3	10.14	10.18	0.39
50.00	10.00	4.73	4.67	1.3	62.20	62.17	0.0	13.15	13.31	1.19
50.00	15.00	5.56	5.48	1.5	70.20	69.88	0.4	12.62	12.75	1.00
45.00	10.00	5.43	5.51	1.6	64.82	65.13	0.5	11.94	11.81	1.09
45.00	15.00	6.30	6.37	1.1	72.96	73.02	0.1	11.58	11.46	1.00
55.00	10.00	3.96	4.00	1.0	58.91	59.20	0.5	14.87	14.80	0.49
55.00	15.00	4.75	4.76	0.1	66.76	66.75	0.0	14.05	14.04	0.13
Sum				20.9			7.8			15.49
RMS_{COP}	$5.59e-02$									
$RMS_{Q_{cond}}$	$2.58e-01$									
$RMS_{W_{comp}}$	$1.39e-01$									

Meier/SIN-50TU/SIN-50TU-Qcond.pdf

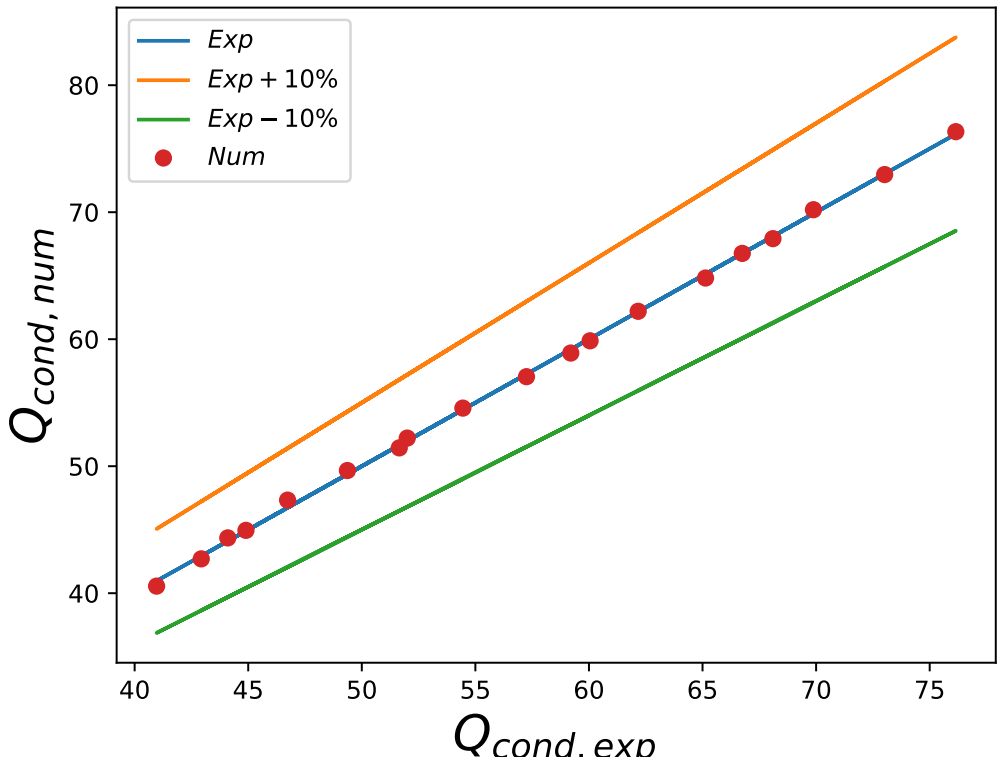

Figure 1: Q_{cond} differences between experiments and fitted data

Meier/SIN-50TU/SIN-50TU-Qcomp.pdf

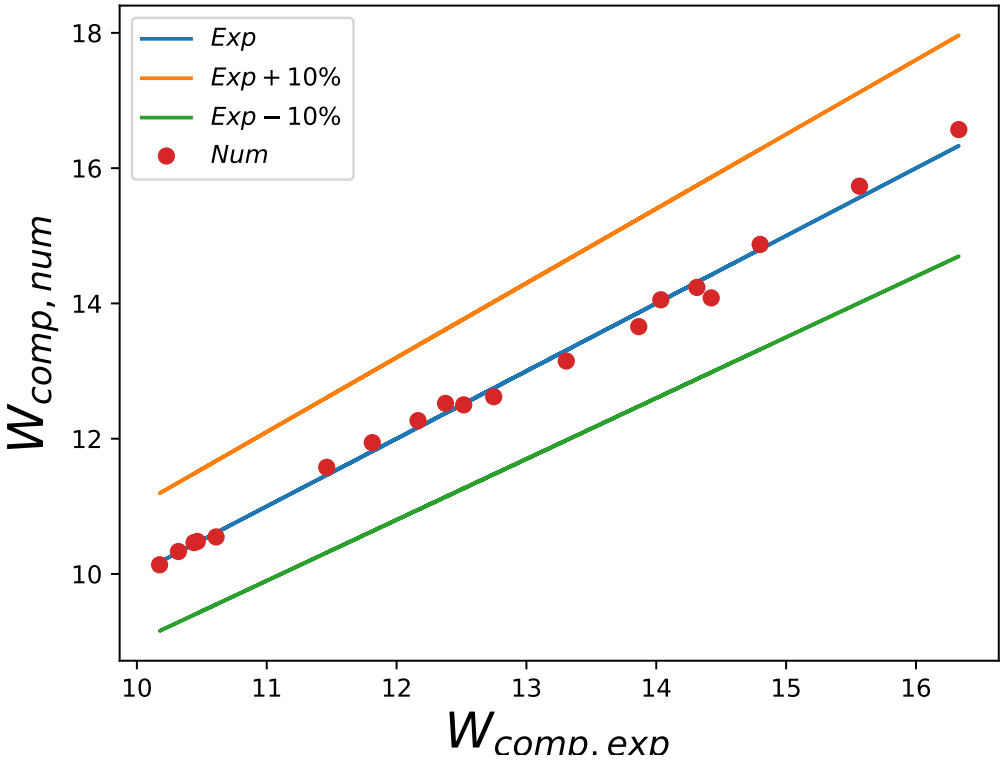

Figure 2: W_{comp} differences between experiments and fitted data

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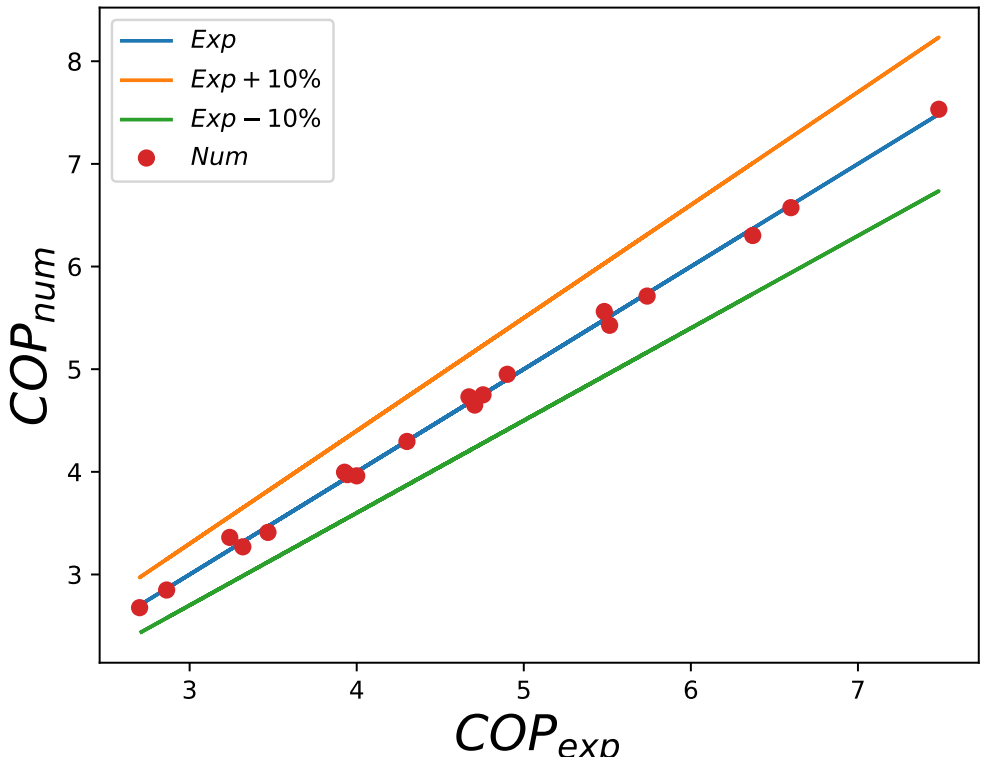

Figure 3: *COP* differences between experiments and fitted data