INSTITUT FÜR SOLARTECHNIK

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Type977 fitting for heat pump SIN-130TE

Parametric Heat Pump calculation

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Table 1: Fitted coefficients for the heat pump.

Coefficient	Description	$[kW]$
P_{Q_1}	1^{st} *condenser polynomial coefficient*	1.1017e+02
P_{Q_2}	2^{st} *condenser polynomial coefficient*	8.3243e+02
P_{Q_3}	3^{st} *condenser polynomial coefficient*	4.1398e+02
P_{Q_4}	4^{st} *condenser polynomial coefficient*	-2.2461e+00
P_{Q_5}	5^{st} *condenser polynomial coefficient*	3.3288e+02
P_{Q_6}	6^{st} *condenser polynomial coefficient*	-2.1955e+03
P_{COP_1}	1^{st} *COP polynomial coefficient*	5.2782e+00
P_{COP_2}	2^{st} *COP polynomial coefficient*	3.3528e+01
P_{COP_3}	3^{st} *COP polynomial coefficient*	2.0320e+00
P_{COP_4}	4^{st} *COP polynomial coefficient*	-7.8493e+01
P_{COP_5}	5^{st} *COP polynomial coefficient*	7.6224e+00
P_{COP_6}	6^{st} *COP polynomial coefficient*	-8.5718e+01
$\dot{m}_{cond}$	21000.00 $[kg/h]$	
$\dot{m}_{evap}$	21000.00 $[kg/h]$	
COP_{nom} (A0W35)	4.09	
$Q_{cond,nom}$ (A0W35)	120.76 $[kW]$	
$Q_{evap,nom}$ (A0W35)	91.20 $[kW]$	
$W_{comp,nom}$ (A0W35)	29.56 $[kW]$	
RMS_{COP}	$3.64e-02$	
$RMS_{Q_{cond}}$	$2.99e-01$	
$RMS_{W_{comp}}$	$3.53e-01$	
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	3.69	3.70	0.2	107.81	107.50	0.3	29.19	29.05	0.48
35.00	0.00	4.12	4.10	0.6	122.04	122.00	0.0	29.60	29.76	0.54
35.00	5.00	4.56	4.55	0.1	136.43	136.55	0.1	29.93	29.99	0.21
50.00	-5.00	2.53	2.50	1.2	96.05	96.17	0.1	37.91	38.41	1.31
50.00	0.00	2.89	2.84	2.1	110.49	109.87	0.6	38.17	38.75	1.51
50.00	5.00	3.27	3.21	1.6	125.15	124.75	0.3	38.31	38.81	1.29
45.00	-5.00	2.98	3.02	1.3	101.37	101.83	0.5	34.00	33.73	0.81
45.00	0.00	3.37	3.38	0.5	115.76	115.93	0.2	34.39	34.26	0.39
45.00	5.00	3.76	3.80	1.0	130.33	130.65	0.2	34.67	34.40	0.78
55.00	0.00	2.37	2.40	1.3	103.93	103.80	0.1	43.88	43.25	1.45
55.00	5.00	2.72	2.75	1.1	118.68	118.85	0.1	43.64	43.22	0.97
35.00	10.00	5.00	5.00	0.0	151.01	151.10	0.1	30.19	30.22	0.09
35.00	15.00	5.45	5.44	0.2	165.75	165.65	0.1	30.41	30.45	0.12
50.00	10.00	3.65	3.59	1.5	139.99	139.63	0.3	38.40	38.87	1.20
50.00	15.00	4.03	3.97	1.5	154.99	154.52	0.3	38.45	38.92	1.20
45.00	10.00	4.16	4.21	1.2	145.07	145.37	0.2	34.88	34.54	0.98
45.00	15.00	4.57	4.62	1.1	159.99	160.08	0.1	35.04	34.69	1.03
55.00	10.00	3.08	3.10	0.8	133.59	133.90	0.2	43.42	43.19	0.53
55.00	15.00	3.44	3.45	0.3	148.68	148.95	0.2	43.21	43.16	0.12
Sum				17.6			3.9			15.00
RMS_{COP}	$3.64e-02$									
$RMS_{Q_{cond}}$	$2.99e-01$									
$RMS_{W_{comp}}$	$3.53e-01$									

Meier/SIN-130TE/SIN-130TE-Qcond.pdf

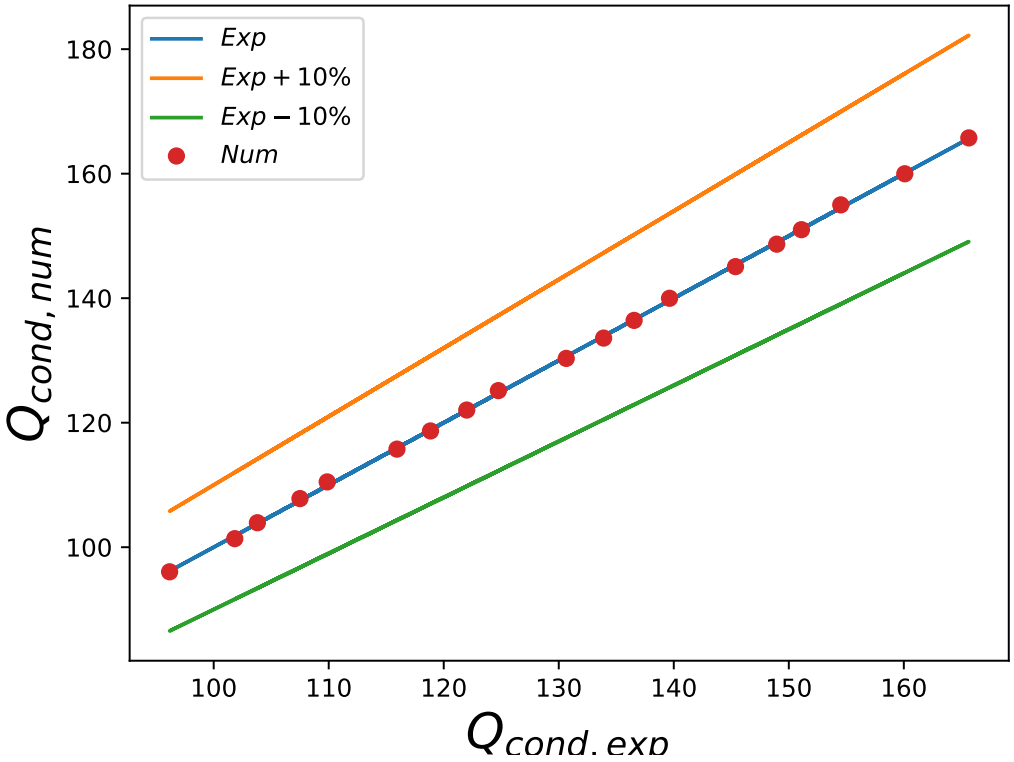

Figure 1: Q_{cond} differences between experiments and fitted data

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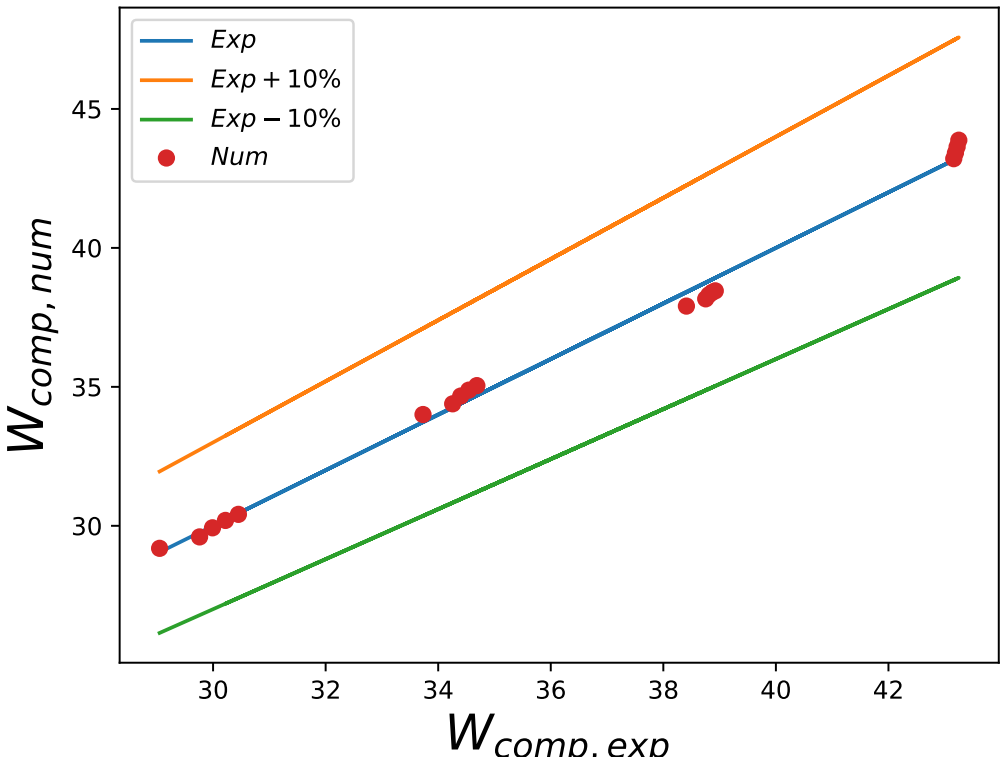

Figure 2: W_{comp} differences between experiments and fitted data

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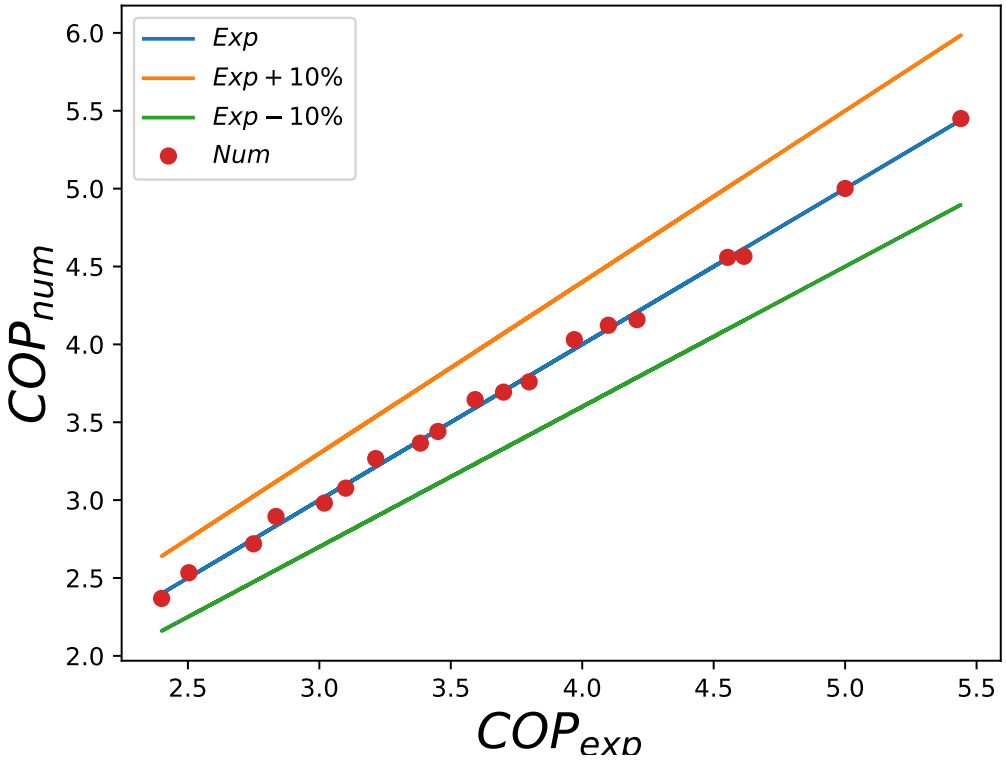

Figure 3: *COP* differences between experiments and fitted data