INSTITUT FÜR SOLARTECHNIK

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Type977 fitting for heat pump SI-GEO-12-40

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*	4.2591e+01
P_{Q_2}	2^{st} *condenser polynomial coefficient*	5.1331e+02
P_{Q_3}	3^{st} *condenser polynomial coefficient*	1.2416e+02
P_{Q_4}	4^{st} *condenser polynomial coefficient*	-4.9565e+02
P_{Q_5}	5^{st} *condenser polynomial coefficient*	1.8510e+02
P_{Q_6}	6^{st} *condenser polynomial coefficient*	-6.3589e+02
P_{COP_1}	1^{st} *COP polynomial coefficient*	4.6857e+00
P_{COP_2}	2^{st} *COP polynomial coefficient*	6.6191e+01
P_{COP_3}	3^{st} *COP polynomial coefficient*	1.4660e+01
P_{COP_4}	4^{st} *COP polynomial coefficient*	-1.8831e+02
P_{COP_5}	5^{st} *COP polynomial coefficient*	9.2342e-01
P_{COP_6}	6^{st} *COP polynomial coefficient*	-1.2266e+02
$\dot{m}_{cond}$	7312.00 $[kg/h]$	
$\dot{m}_{evap}$	7312.00 $[kg/h]$	
COP_{nom} (A0W35)	4.29	
$Q_{cond,nom}$ (A0W35)	44.22 $[kW]$	
$Q_{evap,nom}$ (A0W35)	33.92 $[kW]$	
$W_{comp,nom}$ (A0W35)	10.30 $[kW]$	
RMS_{COP}	$7.70e-02$	
$RMS_{Q_{cond}}$	$9.72e-02$	
$RMS_{W_{comp}}$	$1.93e-01$	
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	3.60	3.70	2.5	37.25	37.29	0.1	10.34	10.09	2.47
35.00	0.00	4.34	4.10	5.9	44.69	44.60	0.2	10.29	10.88	5.40
35.00	5.00	5.09	5.20	2.0	52.25	52.28	0.1	10.26	10.05	2.03
50.00	-5.00	2.70	2.67	1.4	34.88	34.95	0.2	12.91	13.11	1.53
50.00	0.00	3.29	3.23	1.7	41.99	41.77	0.5	12.77	12.92	1.17
50.00	5.00	3.89	3.83	1.6	49.24	49.16	0.2	12.66	12.83	1.37
45.00	-5.00	3.08	3.11	0.9	36.04	36.12	0.2	11.69	11.60	0.73
45.00	0.00	3.72	3.78	1.5	43.27	43.19	0.2	11.62	11.43	1.68
45.00	5.00	4.38	4.43	1.3	50.63	50.72	0.2	11.57	11.44	1.09
55.00	0.00	2.77	2.80	1.0	40.37	40.36	0.0	14.55	14.40	1.02
55.00	5.00	3.32	3.35	0.7	47.50	47.60	0.2	14.29	14.22	0.48
35.00	10.00	5.85	5.90	0.8	59.92	59.95	0.1	10.24	10.16	0.72
35.00	15.00	6.62	6.58	0.6	67.70	67.63	0.1	10.22	10.27	0.48
50.00	10.00	4.50	4.44	1.4	56.60	56.54	0.1	12.58	12.74	1.32
50.00	15.00	5.12	5.05	1.4	64.07	63.92	0.2	12.52	12.66	1.16
45.00	10.00	5.04	5.08	0.9	58.10	58.25	0.3	11.53	11.46	0.65
45.00	15.00	5.71	5.74	0.5	65.68	65.78	0.2	11.51	11.46	0.38
55.00	10.00	3.88	3.91	0.6	54.74	54.84	0.2	14.10	14.04	0.45
55.00	15.00	4.45	4.48	0.7	62.10	62.08	0.0	13.96	13.86	0.76
Sum				27.4			3.2			24.88
RMS_{COP}	$7.70e-02$									
$RMS_{Q_{cond}}$	$9.72e-02$									
$RMS_{W_{comp}}$	$1.93e-01$									

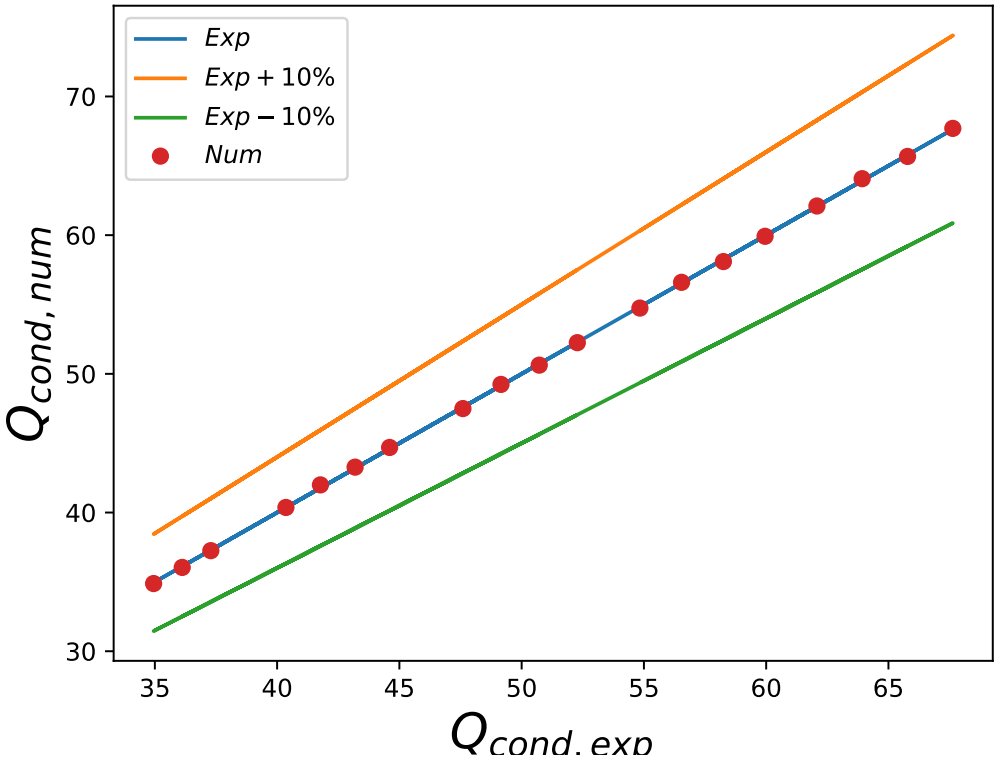

Figure 1: Q_{cond} differences between experiments and fitted data

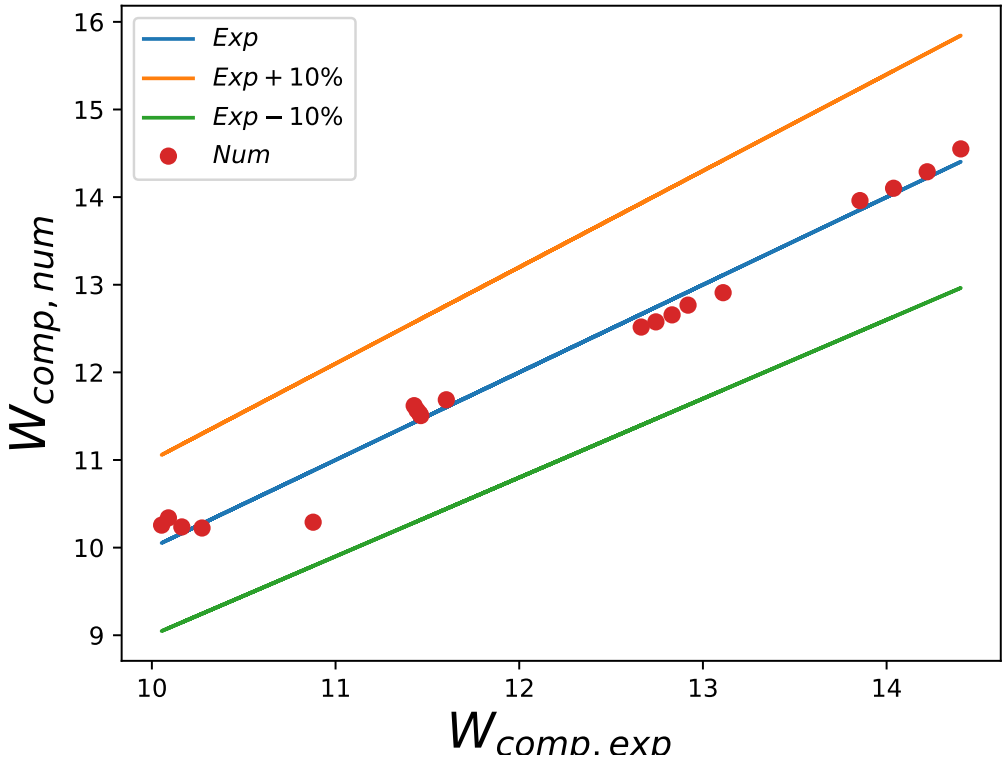

Figure 2: W_{comp} differences between experiments and fitted data

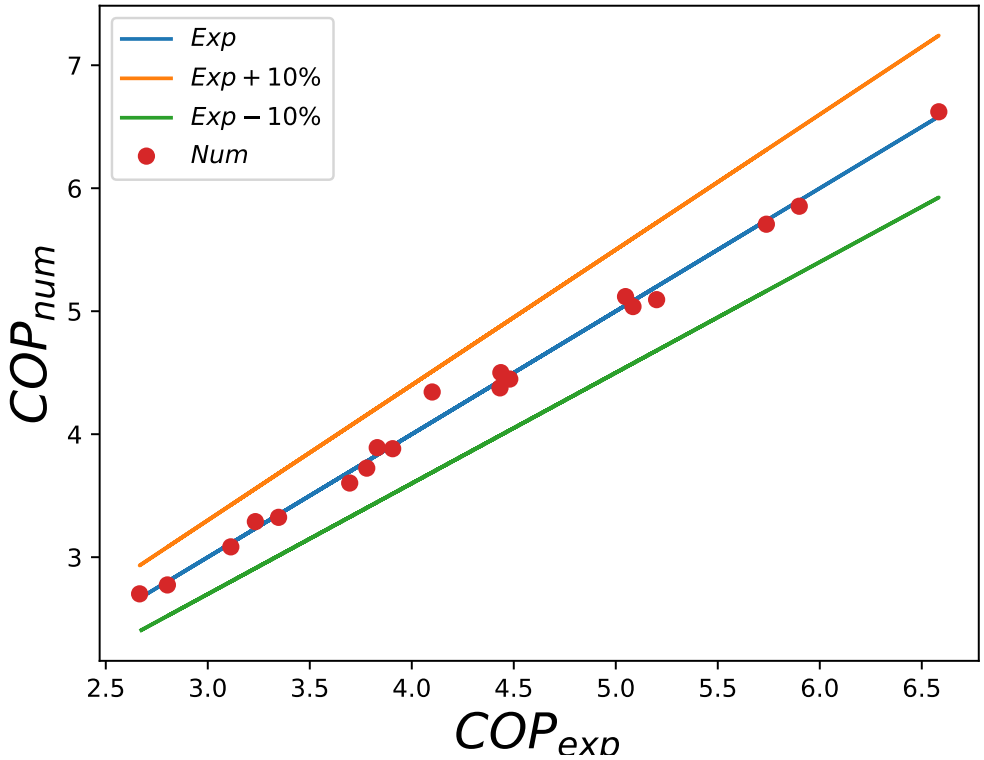

Figure 3: COP differences between experiments and fitted data