INSTITUT FÜR SOLARTECHNIK

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Type977 fitting for heat pump SI-GEO-3-12-1

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*	1.3684e+01
P_{Q_2}	2^{st} *condenser polynomial coefficient*	1.6424e+02
P_{Q_3}	3^{st} *condenser polynomial coefficient*	3.9527e+01
P_{Q_4}	4^{st} *condenser polynomial coefficient*	-1.5678e+02
P_{Q_5}	5^{st} *condenser polynomial coefficient*	5.8177e+01
P_{Q_6}	6^{st} *condenser polynomial coefficient*	-2.0319e+02
P_{COP_1}	1^{st} *COP polynomial coefficient*	5.0630e+00
P_{COP_2}	2^{st} *COP polynomial coefficient*	6.2434e+01
P_{COP_3}	3^{st} *COP polynomial coefficient*	1.0766e+01
P_{COP_4}	4^{st} *COP polynomial coefficient*	-1.6453e+02
P_{COP_5}	5^{st} *COP polynomial coefficient*	-1.4435e+01
P_{COP_6}	6^{st} *COP polynomial coefficient*	-1.1265e+02
$\dot{m}_{cond}$	2344.00 $[kg/h]$	
$\dot{m}_{evap}$	2344.00 $[kg/h]$	
COP_{nom} (A0W35)	4.36	
$Q_{cond,nom}$ (A0W35)	14.18 $[kW]$	
$Q_{evap,nom}$ (A0W35)	10.93 $[kW]$	
$W_{comp,nom}$ (A0W35)	3.26 $[kW]$	
RMS_{COP}	$4.77e-02$	
$RMS_{Q_{cond}}$	$3.12e-02$	
$RMS_{W_{comp}}$	$3.90e-02$	
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	3.67	3.70	0.8	11.94	11.96	0.1	3.26	3.23	0.66
35.00	0.00	4.40	4.30	2.4	14.33	14.30	0.2	3.25	3.33	2.18
35.00	5.00	5.14	5.20	1.1	16.75	16.76	0.0	3.26	3.22	1.07
50.00	-5.00	2.69	2.67	0.8	11.18	11.21	0.2	4.16	4.20	0.95
50.00	0.00	3.29	3.23	1.7	13.46	13.39	0.5	4.09	4.14	1.15
50.00	5.00	3.90	3.83	1.7	15.79	15.76	0.2	4.05	4.11	1.50
45.00	-5.00	3.09	3.11	0.8	11.56	11.58	0.2	3.74	3.72	0.59
45.00	0.00	3.74	3.78	1.1	13.87	13.85	0.2	3.71	3.66	1.32
45.00	5.00	4.39	4.43	1.0	16.23	16.26	0.2	3.70	3.67	0.79
55.00	0.00	2.77	2.80	1.2	12.94	12.94	0.0	4.68	4.62	1.26
55.00	5.00	3.33	3.35	0.5	15.23	15.26	0.2	4.57	4.56	0.31
35.00	10.00	5.88	5.90	0.3	19.21	19.22	0.1	3.27	3.26	0.26
35.00	15.00	6.62	6.58	0.5	21.71	21.68	0.1	3.28	3.29	0.40
50.00	10.00	4.50	4.44	1.5	18.15	18.13	0.1	4.03	4.09	1.35
50.00	15.00	5.11	5.05	1.2	20.54	20.50	0.2	4.02	4.06	0.93
45.00	10.00	5.04	5.08	0.9	18.63	18.68	0.3	3.70	3.67	0.61
45.00	15.00	5.69	5.74	0.8	21.06	21.09	0.2	3.70	3.68	0.65
55.00	10.00	3.89	3.91	0.4	17.55	17.58	0.2	4.51	4.50	0.24
55.00	15.00	4.45	4.48	0.7	19.91	19.90	0.0	4.47	4.44	0.74
Sum				19.4			3.2			16.99
RMS_{COP}	$4.77e-02$									
$RMS_{Q_{cond}}$	$3.12e-02$									
$RMS_{W_{comp}}$	$3.90e-02$									

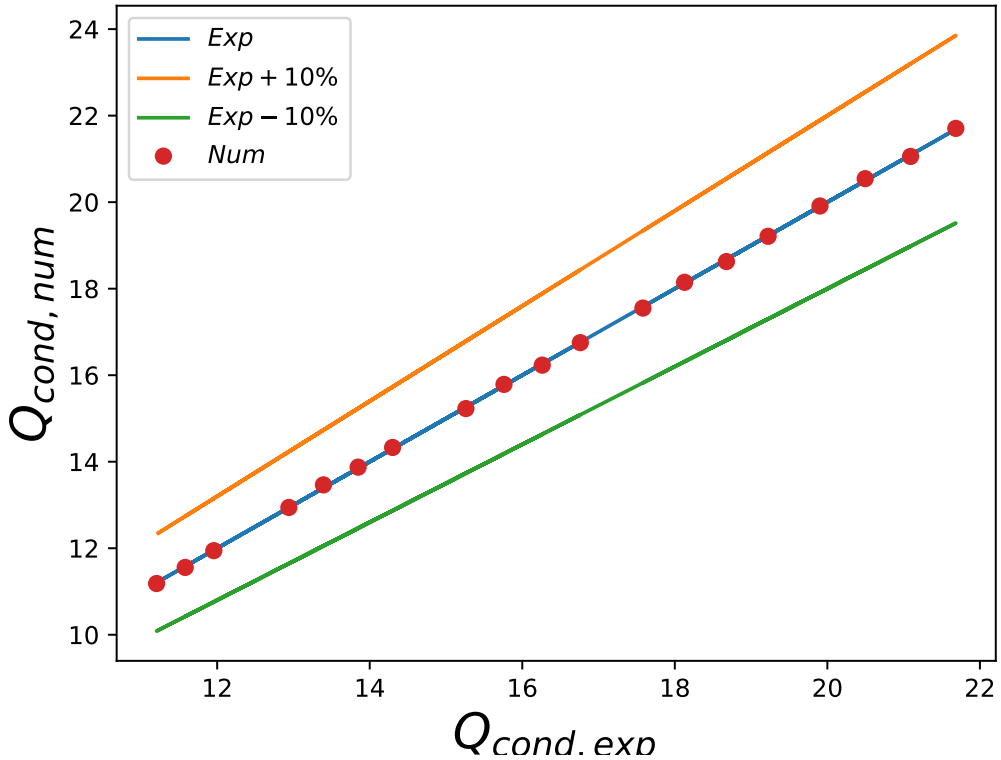

Figure 1: Q_{cond} differences between experiments and fitted data

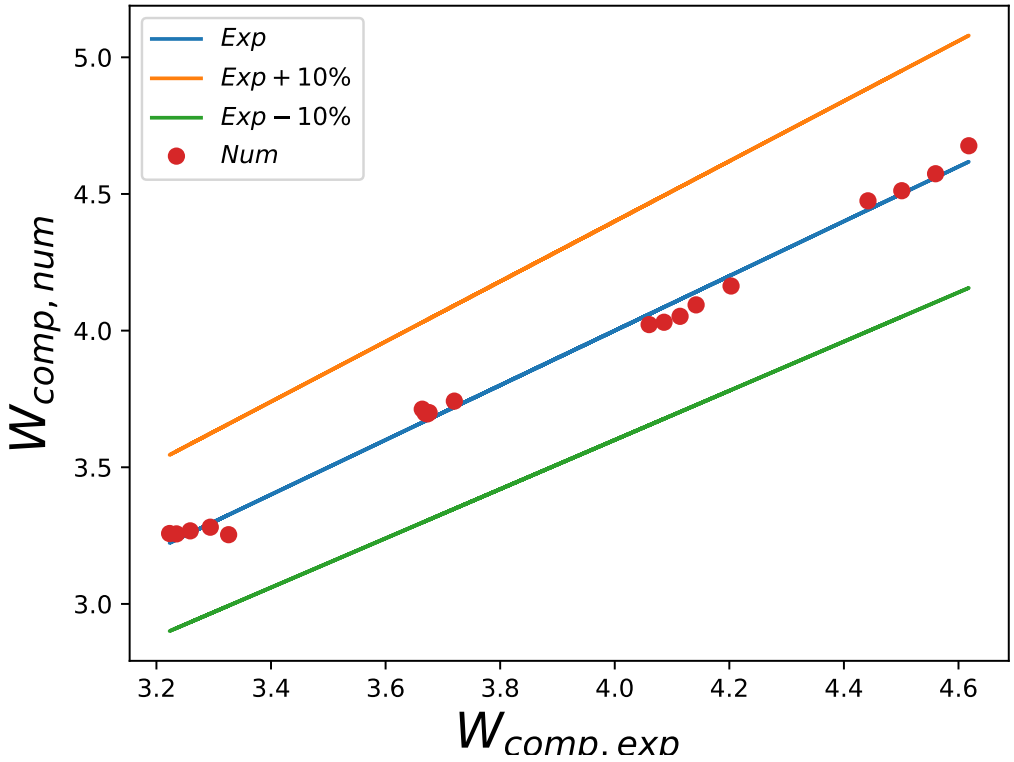

Figure 2: W_{comp} differences between experiments and fitted data

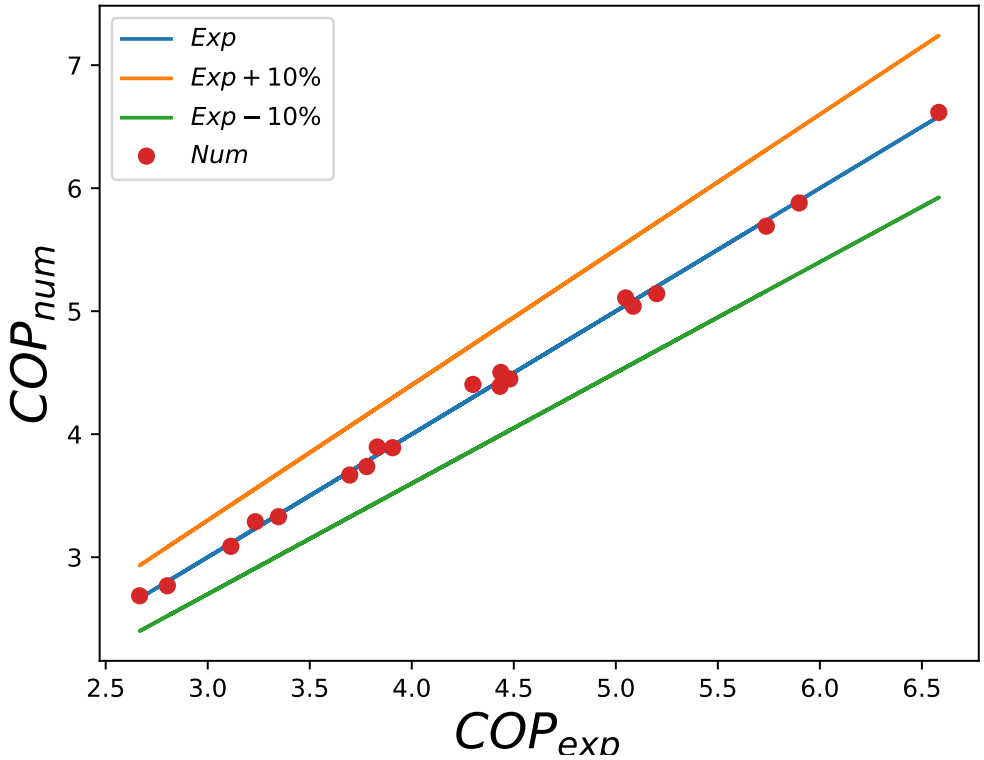

Figure 3: COP differences between experiments and fitted data