INSTITUT FÜR SOLARTECHNIK

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Type977 fitting for heat pump SI-GEO-5-22

Parametric Heat Pump calculation

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2019/03/12 at: 16:02:09 h

Table 1: Fitted coefficients for the heat pump.

Coefficient	Description	
		$[kW]$
P_{Q_1}	1^{st} *condenser polynomial coefficient*	2.4845e+01
P_{Q_2}	2^{st} *condenser polynomial coefficient*	2.9703e+02
P_{Q_3}	3^{st} *condenser polynomial coefficient*	7.0934e+01
P_{Q_4}	4^{st} *condenser polynomial coefficient*	-2.8110e+02
P_{Q_5}	5^{st} *condenser polynomial coefficient*	1.0292e+02
P_{Q_6}	6^{st} *condenser polynomial coefficient*	-3.6622e+02
P_{COP_1}	1^{st} *COP polynomial coefficient*	5.4508e+00
P_{COP_2}	2^{st} *COP polynomial coefficient*	5.8709e+01
P_{COP_3}	3^{st} *COP polynomial coefficient*	6.7296e+00
P_{COP_4}	4^{st} *COP polynomial coefficient*	-1.4094e+02
P_{COP_5}	5^{st} *COP polynomial coefficient*	-2.9672e+01
P_{COP_6}	6^{st} *COP polynomial coefficient*	-1.0217e+02
$\dot{m}_{cond}$	4246.00 $[kg/h]$	
$\dot{m}_{evap}$	4246.00 $[kg/h]$	
COP_{nom} (A0W35)	4.42	
$Q_{cond,nom}$ (A0W35)	25.70 $[kW]$	
$Q_{evap,nom}$ (A0W35)	19.88 $[kW]$	
$W_{comp,nom}$ (A0W35)	5.82 $[kW]$	
RMS_{COP}	$3.90e-02$	
$RMS_{Q_{cond}}$	$5.65e-02$	
$RMS_{W_{comp}}$	$6.29e-02$	
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	3.73	3.70	1.0	21.63	21.65	0.1	5.79	5.86	1.11
35.00	0.00	4.47	4.50	0.7	25.95	25.90	0.2	5.81	5.76	0.96
35.00	5.00	5.19	5.20	0.2	30.34	30.36	0.0	5.84	5.84	0.11
50.00	-5.00	2.67	2.67	0.2	20.26	20.30	0.2	7.58	7.61	0.37
50.00	0.00	3.29	3.23	1.7	24.39	24.26	0.5	7.42	7.50	1.14
50.00	5.00	3.90	3.83	1.8	28.59	28.55	0.2	7.33	7.45	1.63
45.00	-5.00	3.09	3.11	0.7	20.93	20.98	0.2	6.77	6.74	0.46
45.00	0.00	3.75	3.78	0.8	25.13	25.08	0.2	6.70	6.64	0.98
45.00	5.00	4.40	4.43	0.7	29.40	29.45	0.2	6.68	6.64	0.52
55.00	0.00	2.76	2.80	1.5	23.44	23.44	0.0	8.49	8.36	1.51
55.00	5.00	3.33	3.35	0.4	27.58	27.64	0.2	8.27	8.26	0.16
35.00	10.00	5.91	5.90	0.1	34.80	34.82	0.1	5.89	5.90	0.18
35.00	15.00	6.61	6.58	0.4	39.31	39.27	0.1	5.95	5.97	0.33
50.00	10.00	4.50	4.44	1.5	32.87	32.83	0.1	7.30	7.40	1.39
50.00	15.00	5.10	5.05	1.0	37.21	37.12	0.2	7.30	7.35	0.72
45.00	10.00	5.04	5.08	0.8	33.74	33.83	0.3	6.69	6.65	0.55
45.00	15.00	5.67	5.74	1.1	38.14	38.20	0.2	6.72	6.66	0.95
55.00	10.00	3.90	3.91	0.2	31.79	31.84	0.2	8.16	8.15	0.04
55.00	15.00	4.45	4.48	0.7	36.06	36.05	0.0	8.10	8.05	0.71
Sum				15.4			3.2			13.81
RMS_{COP}	$3.90e-02$									
$RMS_{Q_{cond}}$	$5.65e-02$									
$RMS_{W_{comp}}$	$6.29e-02$									

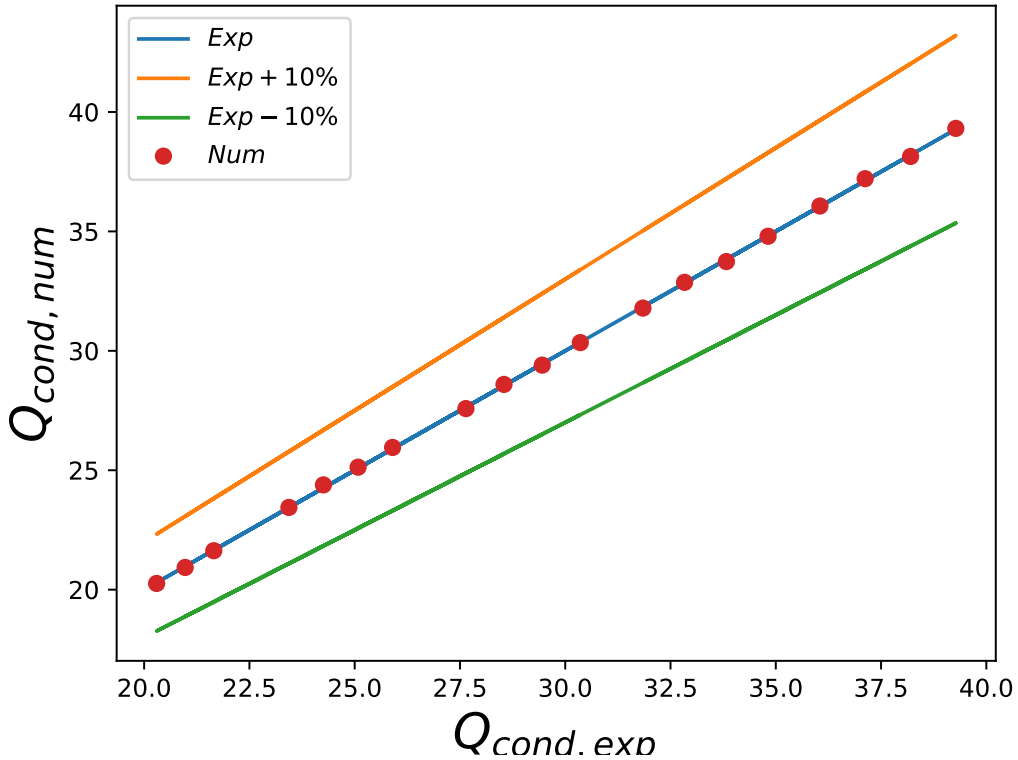

Figure 1: Q_{cond} differences between experiments and fitted data

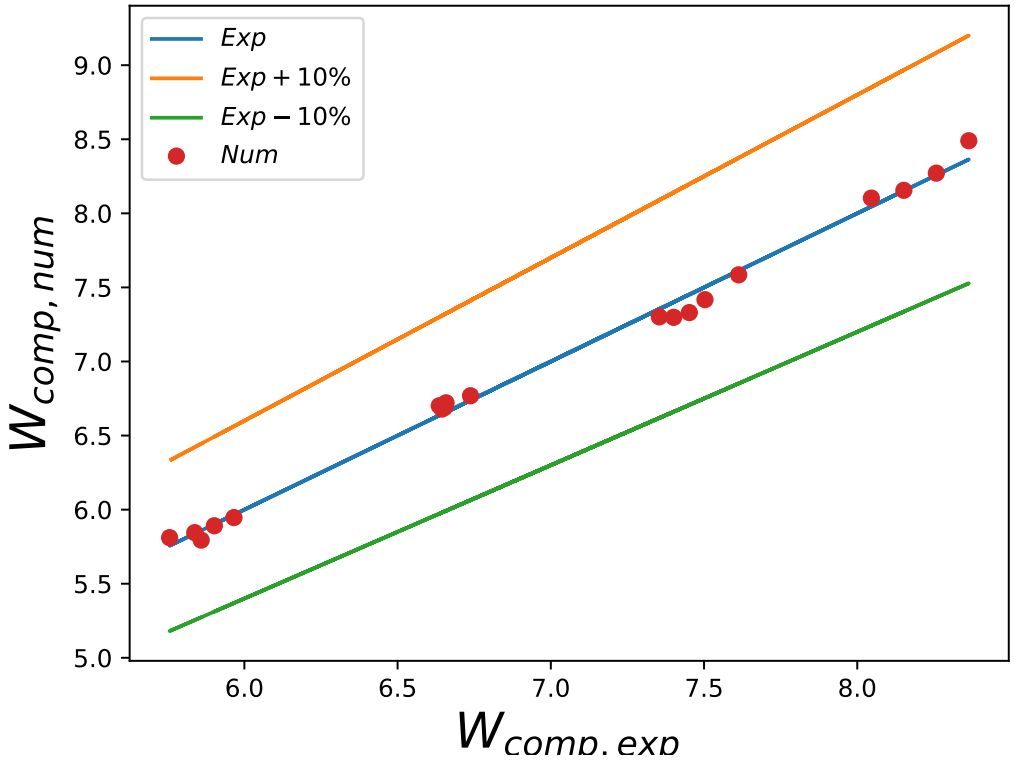

Figure 2: W_{comp} differences between experiments and fitted data

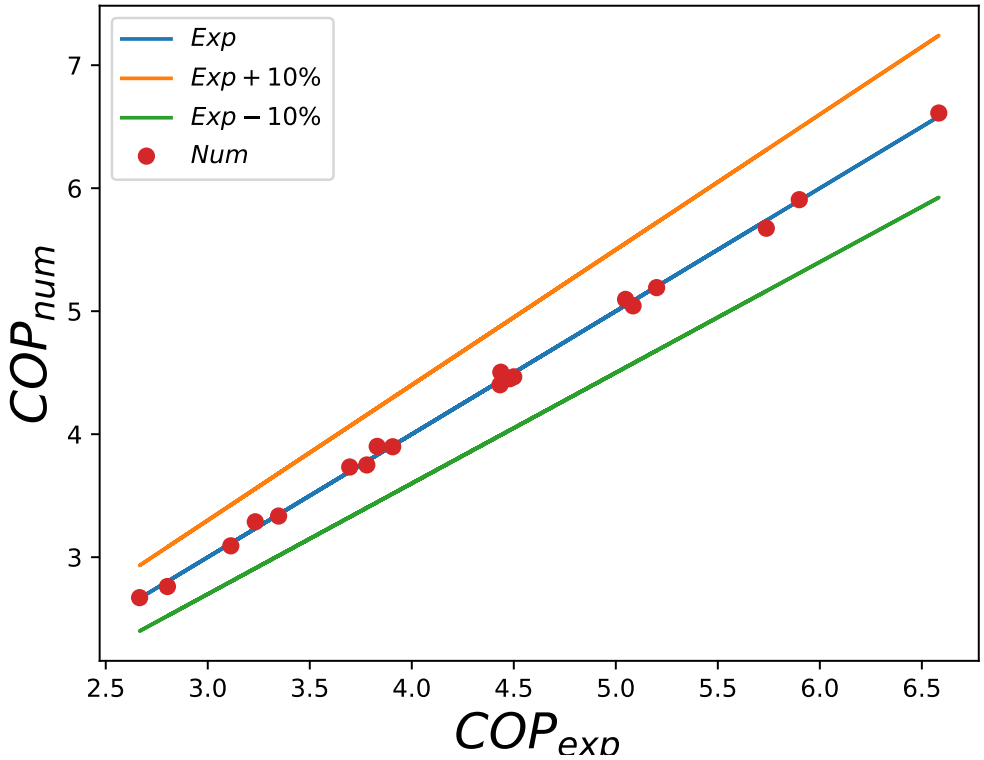

Figure 3: COP differences between experiments and fitted data