INSTITUT FÜR SOLARTECHNIK

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Type977 fitting for heat pump HP12L-K-BC

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*	1.2035e+01
P_{Q_2}	2^{st} *condenser polynomial coefficient*	1.1584e+02
P_{Q_3}	3^{st} *condenser polynomial coefficient*	3.8559e+01
P_{Q_4}	4^{st} *condenser polynomial coefficient*	-4.1638e+01
P_{Q_5}	5^{st} *condenser polynomial coefficient*	1.1925e+02
P_{Q_6}	6^{st} *condenser polynomial coefficient*	-2.3743e+02
P_{COP_1}	1^{st} *COP polynomial coefficient*	8.0895e+00
P_{COP_2}	2^{st} *COP polynomial coefficient*	6.0286e+01
P_{COP_3}	3^{st} *COP polynomial coefficient*	-3.3437e+01
P_{COP_4}	4^{st} *COP polynomial coefficient*	-2.0885e+02
P_{COP_5}	5^{st} *COP polynomial coefficient*	5.5560e+01
P_{COP_6}	6^{st} *COP polynomial coefficient*	1.7328e+01
$\dot{m}_{cond}$	2400.00 $[kg/h]$	
$\dot{m}_{evap}$	6000.00 $[kg/h]$	
COP_{nom} (A0W35)	4.04	
$Q_{cond,nom}$ (A0W35)	12.26 $[kW]$	
$Q_{evap,nom}$ (A0W35)	9.22 $[kW]$	
$W_{comp,nom}$ (A0W35)	3.04 $[kW]$	
RMS_{COP}	$9.95e-02$	
$RMS_{Q_{cond}}$	$2.69e-01$	
$RMS_{W_{comp}}$	$8.42e-02$	
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	20.00	6.75	6.83	1.2	20.12	20.07	0.2	2.98	2.94	1.45
35.00	10.00	5.32	5.29	0.6	16.10	16.36	1.6	3.02	3.09	2.13
35.00	7.00	4.92	4.96	0.9	14.94	15.14	1.3	3.04	3.05	0.45
35.00	2.00	4.26	4.08	4.2	13.04	12.54	4.0	3.06	3.07	0.21
35.00	-7.00	3.22	3.22	0.1	9.81	9.72	0.9	3.04	3.02	0.81
35.00	-15.00	2.40	2.51	4.5	7.10	7.30	2.8	2.96	2.91	1.76
45.00	7.00	3.78	3.73	1.2	14.10	14.22	0.9	3.73	3.81	2.08
45.00	2.00	3.25	3.14	3.6	12.19	11.83	3.0	3.75	3.77	0.54
45.00	-7.00	2.44	2.39	1.8	8.95	8.81	1.6	3.67	3.68	0.23
45.00	-15.00	1.82	1.81	0.4	6.23	6.40	2.6	3.43	3.54	3.05
50.00	20.00	4.54	4.47	1.7	18.63	18.37	1.4	4.10	4.11	0.28
50.00	15.00	4.04	4.15	2.8	16.62	17.14	3.0	4.12	4.13	0.27
50.00	7.00	3.23	3.45	6.4	13.46	13.80	2.4	4.17	4.00	4.21
50.00	2.00	2.76	2.78	0.8	11.54	11.30	2.1	4.18	4.06	2.96
50.00	-7.00	2.06	2.06	0.2	8.29	8.20	1.1	4.03	3.99	0.95
55.00	20.00	3.83	3.69	3.6	17.84	17.55	1.6	4.66	4.75	1.93
55.00	7.00	2.68	2.80	4.5	12.67	12.98	2.4	4.73	4.63	2.20
55.00	-7.00	1.68	1.59	5.7	7.48	7.38	1.3	4.44	4.63	4.12
Sum				44.0			34.4			29.61
RMS_{COP}	$9.95e-02$									
$RMS_{Q_{cond}}$	$2.69e-01$									
$RMS_{W_{comp}}$	$8.42e-02$									

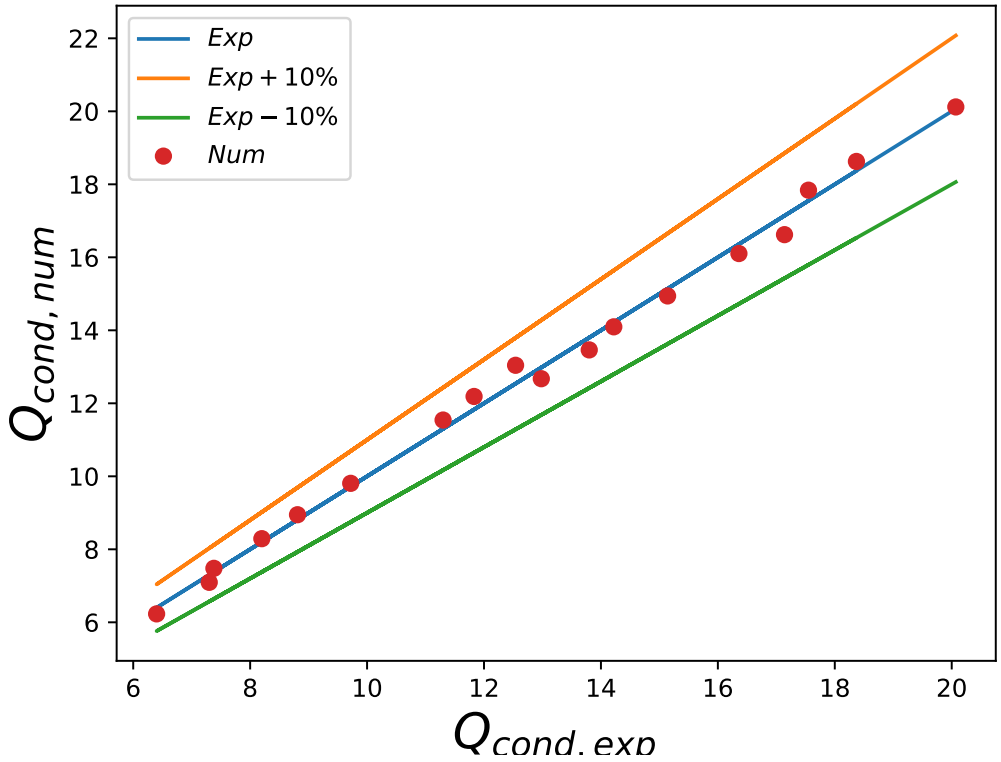

Figure 1: Q_{cond} differences between experiments and fitted data

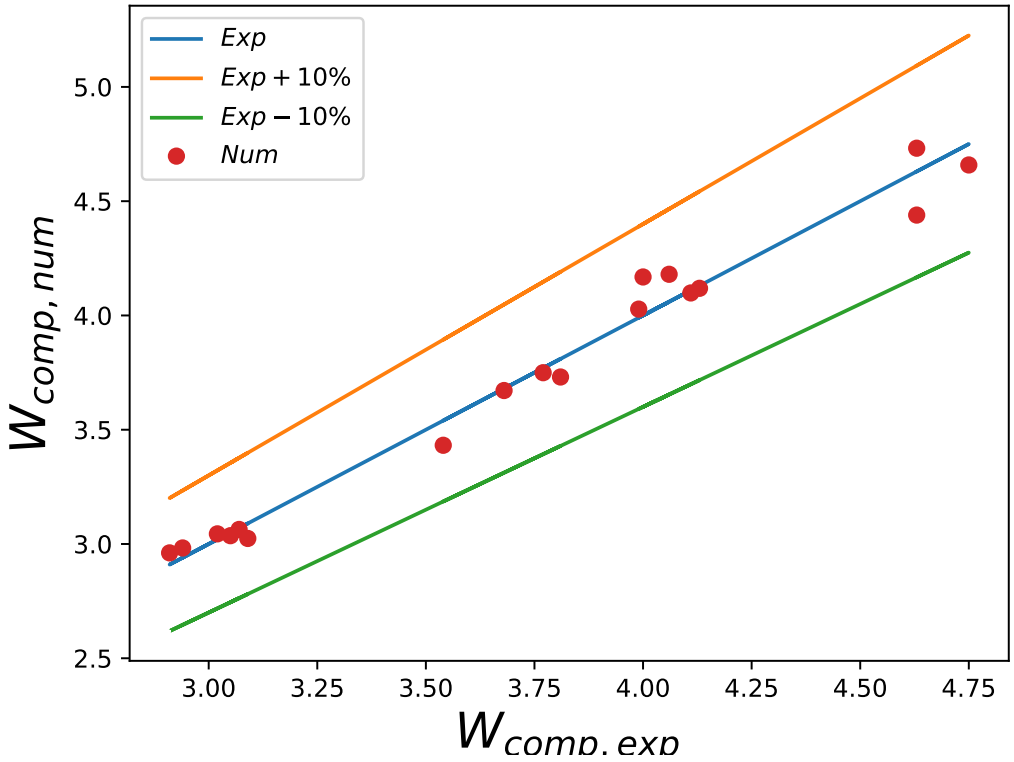

Figure 2: W_{comp} differences between experiments and fitted data

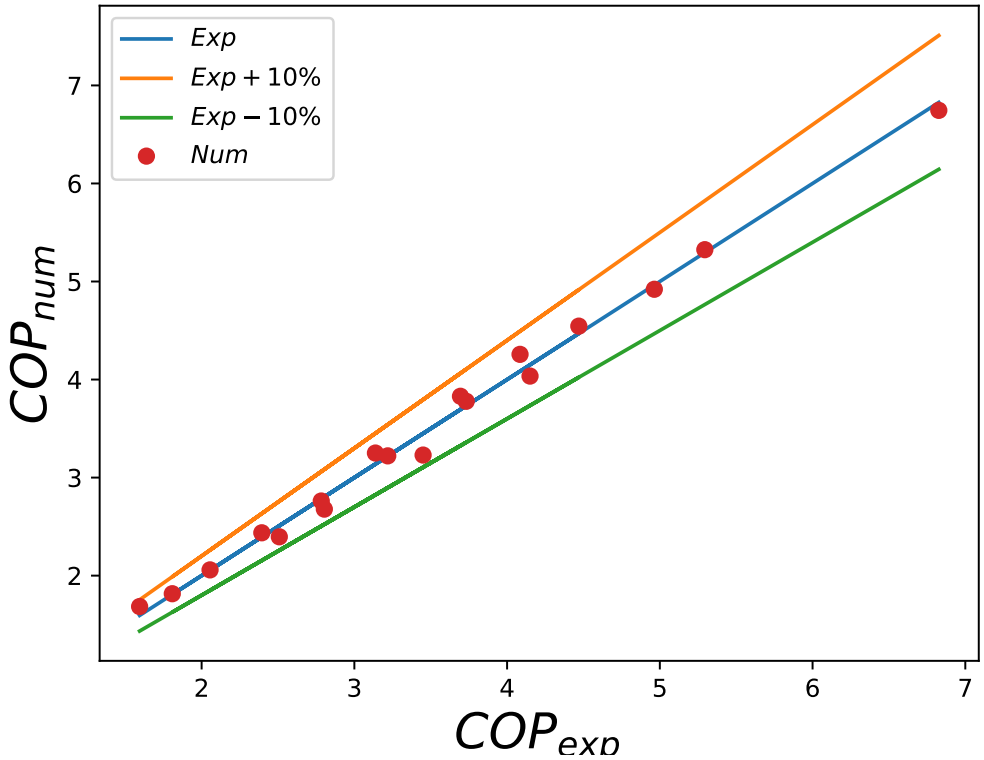

Figure 3: COP differences between experiments and fitted data