INSTITUT FÜR SOLARTECHNIK

OST Ostschweizer Fachhochschule

Type977 fitting for heat pump Propane2HPFit_Nom

Parametric Heat Pump calculation

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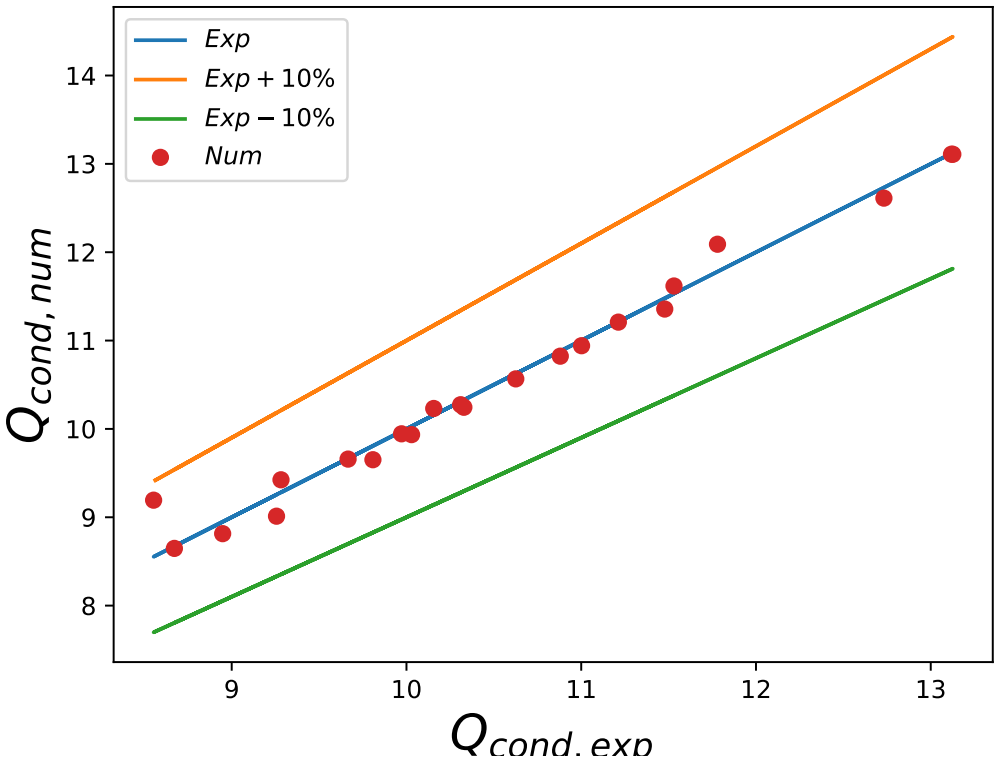

Figure 1: Q_{cond} differences between experiments and fitted data

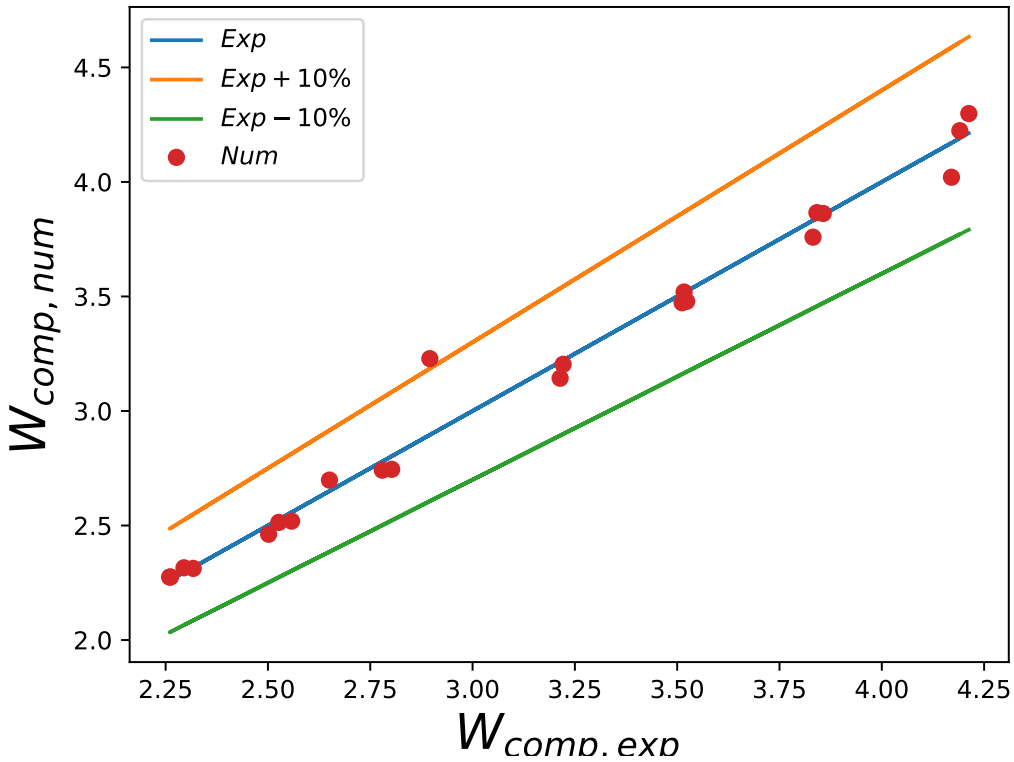

Figure 2: W_{comp} differences between experiments and fitted data

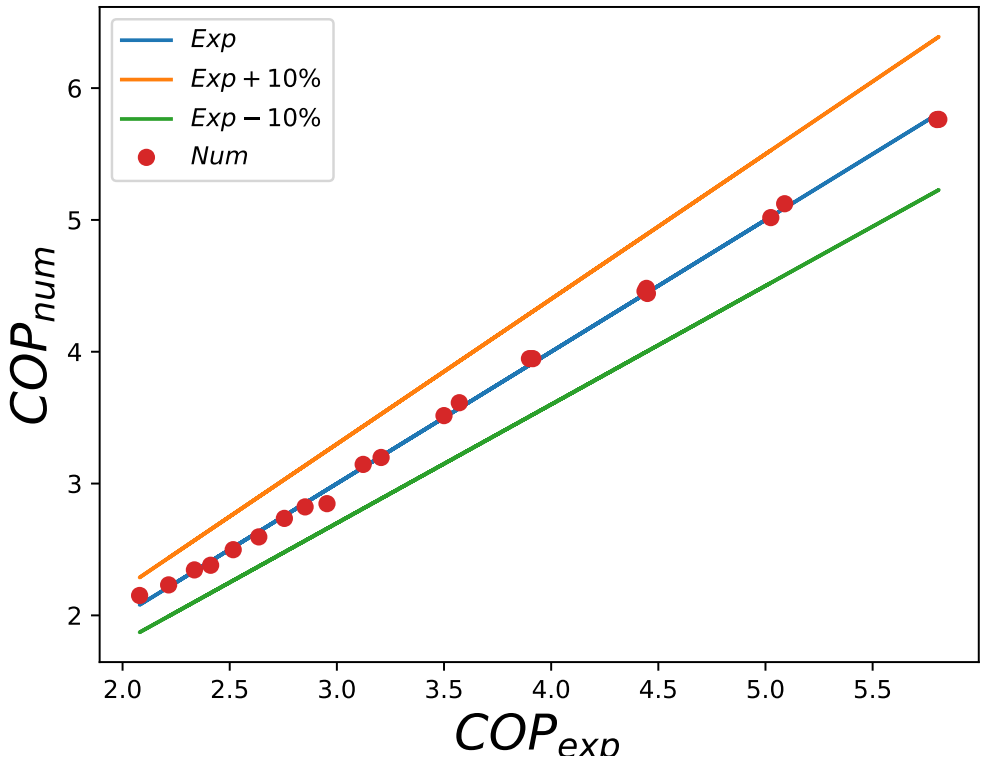

Figure 3: COP differences between experiments and fitted data

Table 1: Fitted coefficients for the heat pump.

Coefficient	Description	$[kW]$
P_{Q_1}	1^{st} *condenser polynomial coefficient*	1.3627e+01
P_{Q_2}	2^{nd} *condenser polynomial coefficient*	1.2402e+02
P_{Q_3}	3^{rd} *condenser polynomial coefficient*	-3.1044e+01
P_{Q_4}	4^{th} *condenser polynomial coefficient*	-3.1104e+02
P_{Q_5}	5^{th} *condenser polynomial coefficient*	-1.2512e+02
P_{Q_6}	6^{th} *condenser polynomial coefficient*	4.5984e+01
P_{COP_1}	1^{st} *COP polynomial coefficient*	9.1557e+00
P_{COP_2}	2^{nd} *COP polynomial coefficient*	6.8584e+01
P_{COP_3}	3^{rd} *COP polynomial coefficient*	-4.7923e+01
P_{COP_4}	4^{th} *COP polynomial coefficient*	-2.6708e+02
P_{COP_5}	5^{th} *COP polynomial coefficient*	8.6761e+01
P_{COP_6}	6^{th} *COP polynomial coefficient*	7.8562e+01
$\dot{m}_{cond}$	1070.90 $[kg/h]$	
$\dot{m}_{evap}$	1757.36 $[kg/h]$	
COP_{nom} (A0W35)	4.24	
$Q_{cond,nom}$ (A0W35)	9.78 $[kW]$	
$Q_{evap,nom}$ (A0W35)	7.47 $[kW]$	
$W_{comp,nom}$ (A0W35)	2.31 $[kW]$	
RMS_{COP}	$3.90e-02$	
$RMS_{Q_{cond}}$	$1.78e-01$	
$RMS_{W_{comp}}$	$8.73e-02$	
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.

$T_{cond,avg}$ ^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 $[\%]$
34.99	0.30	4.44	4.45	0.2	10.27	10.31	0.4	2.31	2.32	0.20
40.01	0.32	3.95	3.90	1.3	9.94	9.97	0.3	2.52	2.56	1.52
45.02	0.29	3.52	3.50	0.4	9.65	9.81	1.6	2.75	2.80	2.04
54.99	0.35	2.85	2.95	3.6	9.19	8.55	7.5	3.23	2.90	11.50
60.01	0.34	2.60	2.64	1.5	9.01	9.26	2.6	3.47	3.51	1.13
65.00	0.33	2.35	2.34	0.4	8.81	8.95	1.5	3.76	3.83	1.91
70.01	0.34	2.15	2.08	3.4	8.65	8.67	0.3	4.02	4.17	3.59
35.04	5.02	5.02	5.02	0.1	11.62	11.53	0.8	2.32	2.29	0.90
40.01	5.01	4.46	4.44	0.5	11.21	11.21	0.0	2.51	2.53	0.51
45.00	5.00	3.95	3.91	0.8	10.82	10.88	0.5	2.74	2.78	1.36
54.97	4.99	3.20	3.21	0.3	10.25	10.33	0.8	3.20	3.22	0.54
60.04	4.98	2.82	2.85	1.0	9.94	10.03	0.9	3.52	3.52	0.07
65.01	4.99	2.50	2.52	0.7	9.66	9.67	0.1	3.87	3.84	0.64
70.00	5.18	2.23	2.21	0.7	9.42	9.28	1.5	4.22	4.19	0.79
35.03	10.01	5.76	5.80	0.7	13.11	13.12	0.1	2.28	2.26	0.60
34.98	9.99	5.76	5.81	0.8	13.11	13.13	0.1	2.27	2.26	0.66
40.01	9.98	5.12	5.09	0.7	12.61	12.73	0.9	2.46	2.50	1.59
45.22	9.98	4.48	4.44	0.8	12.09	11.78	2.6	2.70	2.65	1.81
55.01	10.03	3.61	3.57	1.2	11.36	11.48	1.1	3.14	3.21	2.21
60.04	10.02	3.15	3.12	0.7	10.94	11.00	0.5	3.48	3.52	1.26
65.06	10.02	2.74	2.76	0.7	10.57	10.63	0.6	3.86	3.86	0.14
70.00	10.21	2.38	2.41	1.3	10.23	10.16	0.7	4.30	4.21	2.04
Sum				21.8			25.5			37.00
RMS_{COP}	$3.90e-02$									
$RMS_{Q_{cond}}$	$1.78e-01$									
$RMS_{W_{comp}}$	$8.73e-02$									