INSTITUT FÜR SOLARTECHNIK

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Type977 fitting for heat pump R410A

Parametric Heat Pump calculation

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2021/05/28 at: 10:03:27 h

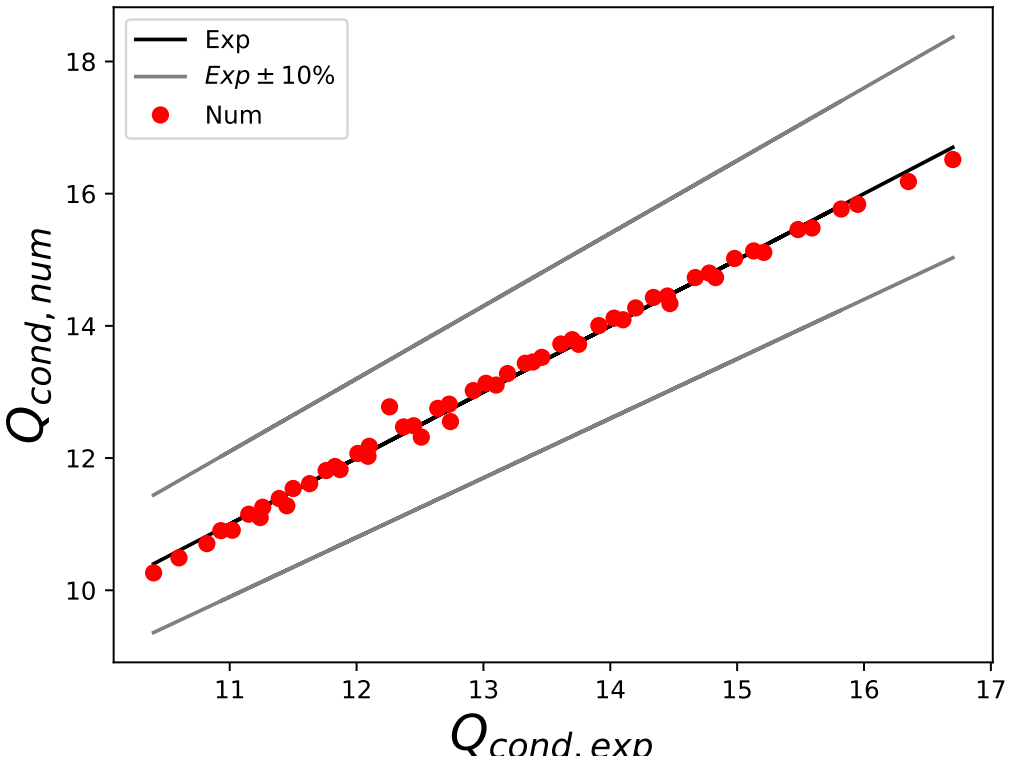

Figure 1: Q_{cond} differences between experiments and fitted data

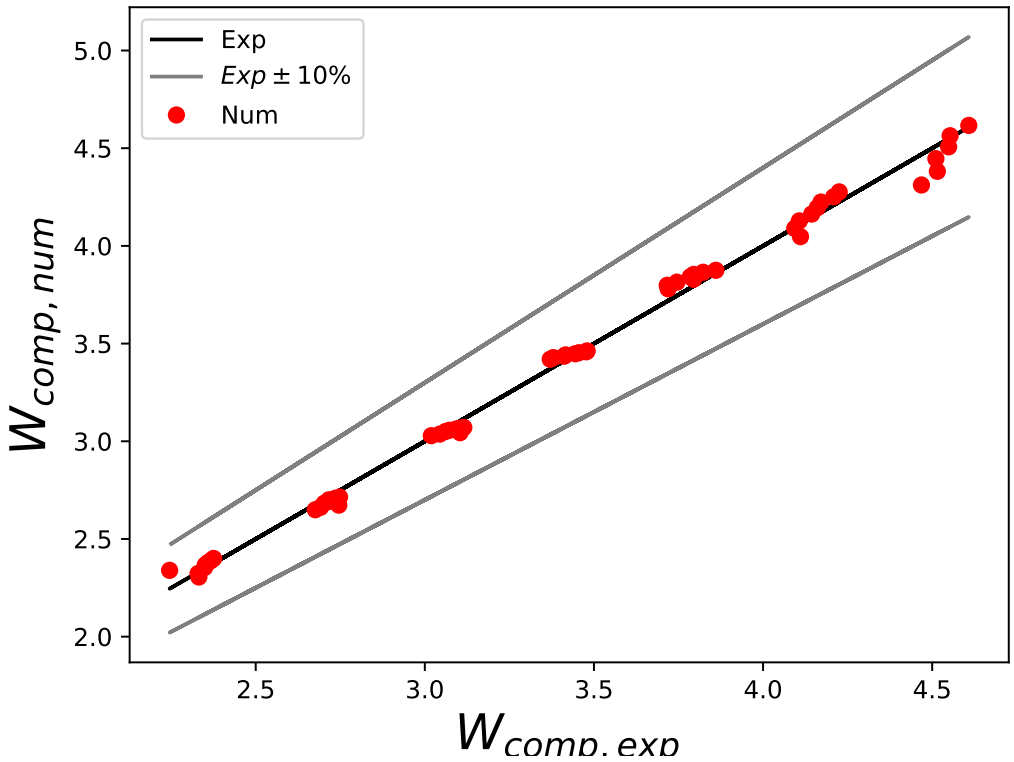

Figure 2: W_{comp} differences between experiments and fitted data

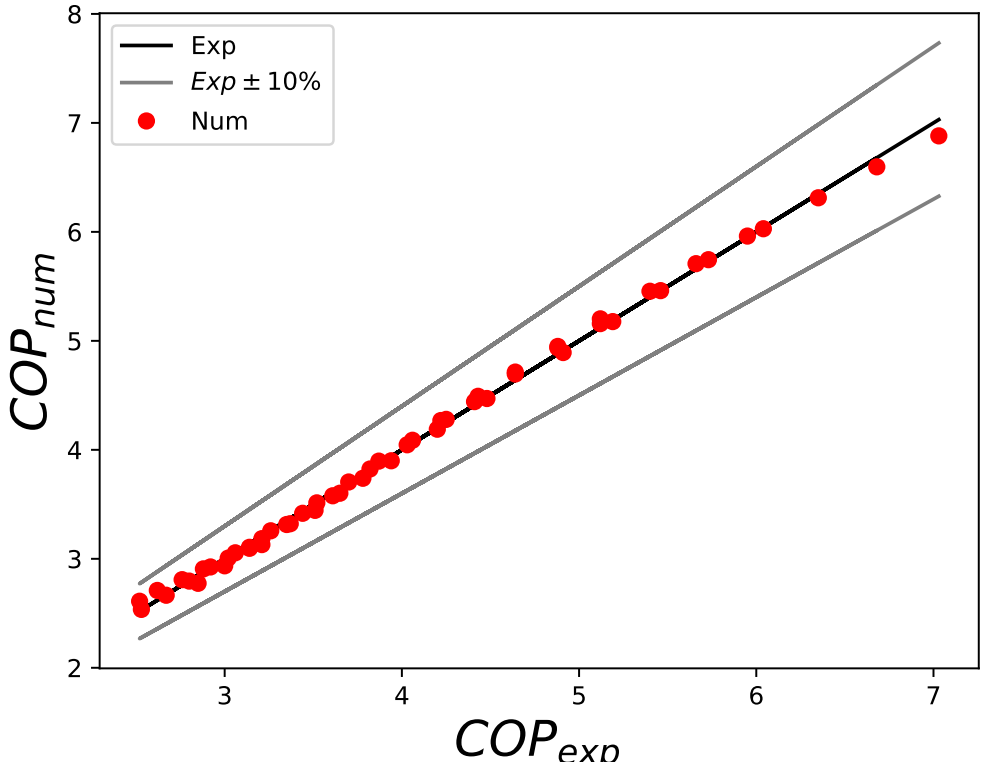

Figure 3: COP differences between experiments and fitted data

Table 1: Fitted coefficients for the heat pump.

Coefficient	Description	$[kW]$
P_{Q_1}	1^{st} *condenser polynomial coefficient*	1.3860e+01
P_{Q_2}	2^{st} *condenser polynomial coefficient*	1.2022e+02
P_{Q_3}	3^{st} *condenser polynomial coefficient*	-7.9046e+00
P_{Q_4}	4^{st} *condenser polynomial coefficient*	-1.6419e+02
P_{Q_5}	5^{st} *condenser polynomial coefficient*	-1.7980e+01
P_{COP_1}	1^{st} *COP polynomial coefficient*	1.2490e+01
P_{COP_2}	2^{st} *COP polynomial coefficient*	6.4065e+01
P_{COP_3}	3^{st} *COP polynomial coefficient*	-8.3022e+01
P_{COP_4}	4^{st} *COP polynomial coefficient*	-2.3012e+02
P_{COP_5}	5^{st} *COP polynomial coefficient*	1.7321e+02
$\dot{m}_{cond}$	10999296.00 $[kg/h]$	
$\dot{m}_{evap}$	10316127.60 $[kg/h]$	
COP_{nom} (A0W35)	4.70	
$Q_{cond,nom}$ (A0W35)	12.55 $[kW]$	
$Q_{evap,nom}$ (A0W35)	9.88 $[kW]$	
$W_{comp,nom}$ (A0W35)	2.67 $[kW]$	
RMS_{COP}	$4.83e-02$	
$RMS_{Q_{cond}}$	$1.16e-01$	
$RMS_{W_{comp}}$	$4.77e-02$	
Fit model	Inlet/Outlet 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 $[\%]$
55.00	-4.00	2.54	2.53	0.2	10.26	10.40	1.3	4.05	4.11	1.54
50.00	-4.00	2.78	2.85	2.6	10.49	10.60	1.0	3.78	3.72	1.64
45.00	-4.00	3.13	3.21	2.5	10.71	10.82	1.1	3.42	3.37	1.46
40.00	-4.00	3.60	3.65	1.3	10.91	11.02	1.0	3.03	3.02	0.32
35.00	-4.00	4.19	4.20	0.3	11.10	11.24	1.2	2.65	2.68	0.99
30.00	-4.00	4.89	4.91	0.4	11.28	11.45	1.5	2.31	2.33	1.15
55.00	-2.00	2.67	2.67	0.2	10.90	10.93	0.3	4.09	4.09	0.10
50.00	-2.00	2.94	3.00	2.1	11.15	11.15	0.0	3.80	3.72	2.20
45.00	-2.00	3.32	3.37	1.4	11.39	11.39	0.0	3.43	3.38	1.43
40.00	-2.00	3.82	3.82	0.1	11.61	11.63	0.1	3.04	3.04	0.25
35.00	-2.00	4.44	4.41	0.7	11.83	11.87	0.4	2.66	2.69	1.10
30.00	-2.00	5.18	5.19	0.3	12.03	12.09	0.5	2.32	2.33	0.27
60.00	0.00	2.61	2.52	3.6	11.26	11.26	0.0	4.31	4.47	3.50
55.00	0.00	2.80	2.80	0.2	11.54	11.50	0.3	4.13	4.11	0.51
50.00	0.00	3.10	3.14	1.4	11.81	11.76	0.4	3.81	3.75	1.85
45.00	0.00	3.51	3.52	0.2	12.07	12.01	0.5	3.44	3.41	0.69
40.00	0.00	4.05	4.03	0.4	12.32	12.51	1.5	3.04	3.10	1.94
35.00	0.00	4.70	4.64	1.2	12.55	12.74	1.5	2.67	2.75	2.64
30.00	0.00	5.46	5.46	0.0	12.78	12.26	4.2	2.34	2.25	4.19
60.00	2.00	2.71	2.62	3.4	11.87	11.83	0.4	4.38	4.52	2.96
55.00	2.00	2.93	2.92	0.2	12.18	12.10	0.6	4.16	4.14	0.46
50.00	2.00	3.26	3.26	0.1	12.47	12.37	0.8	3.83	3.79	0.91
45.00	2.00	3.70	3.70	0.1	12.75	12.64	0.9	3.44	3.42	0.76
40.00	2.00	4.27	4.22	1.2	13.02	12.92	0.8	3.05	3.06	0.37
35.00	2.00	4.95	4.88	1.4	13.28	13.19	0.7	2.68	2.70	0.73
30.00	2.00	5.74	5.73	0.3	13.52	13.46	0.5	2.35	2.35	0.21
60.00	4.00	2.81	2.76	1.8	12.49	12.45	0.3	4.45	4.51	1.42
55.00	4.00	3.06	3.06	0.2	12.82	12.73	0.7	4.19	4.16	0.84
50.00	4.00	3.42	3.44	0.6	13.13	13.02	0.9	3.84	3.78	1.51
45.00	4.00	3.90	3.87	0.7	13.43	13.33	0.8	3.45	3.44	0.10
40.00	4.00	4.49	4.43	1.4	13.73	13.61	0.8	3.06	3.07	0.52
35.00	4.00	5.20	5.12	1.6	14.00	13.91	0.7	2.69	2.72	0.91
30.00	4.00	6.03	6.04	0.2	14.27	14.20	0.5	2.37	2.35	0.69
60.00	6.00	2.91	2.88	1.0	13.10	13.10	0.0	4.51	4.55	0.91
55.00	6.00	3.18	3.21	0.8	13.45	13.39	0.5	4.22	4.17	1.27
50.00	6.00	3.58	3.61	0.9	13.79	13.70	0.7	3.85	3.80	1.56
45.00	6.00	4.09	4.06	0.7	14.12	14.03	0.6	3.45	3.46	0.07
40.00	6.00	4.71	4.64	1.6	14.43	14.34	0.6	3.06	3.09	0.94
35.00	6.00	5.46	5.40	1.0	14.73	14.67	0.4	2.70	2.72	0.60
30.00	6.00	6.31	6.35	0.6	15.02	14.98	0.3	2.38	2.36	0.86
60.00	8.00	3.01	3.02	0.4	13.72	13.75	0.2	4.56	4.55	0.24
55.00	8.00	3.31	3.35	1.1	14.09	14.10	0.1	4.25	4.21	1.01
50.00	8.00	3.74	3.78	1.1	14.45	14.45	0.0	3.87	3.82	1.11
45.00	8.00	4.28	4.25	0.7	14.80	14.78	0.1	3.46	3.48	0.56
40.00	8.00	4.94	4.88	1.1	15.13	15.13	0.0	3.07	3.10	1.10
35.00	8.00	5.71	5.66	0.9	15.46	15.48	0.1	2.71	2.73	0.99
30.00	8.00	6.60	6.68	1.2	15.77	15.82	0.3	2.39	2.37	0.93
60.00	10.00	3.11	3.14	1.1	14.34	14.47	0.9	4.62	4.61	0.18
55.00	10.00	3.44	3.51	1.9	14.73	14.83	0.7	4.28	4.23	1.22
50.00	10.00	3.90	3.94	1.0	15.11	15.21	0.6	3.88	3.86	0.38
45.00	10.00	4.47	4.48	0.2	15.48	15.59	0.7	3.46	3.48	0.50
40.00	10.00	5.16	5.12	0.7	15.84	15.95	0.7	3.07	3.12	1.44
35.00	10.00	5.96	5.95	0.2	16.18	16.35	1.0	2.71	2.75	1.21
30.00	10.00	6.88	7.03	2.1	16.52	16.70	1.1	2.40	2.38	1.04
Sum				52.4			36.1			58.25
RMS_{COP}	$4.83e-02$									
$RMS_{Q_{cond}}$	$1.16e-01$									
$RMS_{W_{comp}}$	$4.77e-02$									