INSTITUT FÜR SOLARTECHNIK

OST Ostschweizer Fachhochschule

Type977 fitting for heat pump PropaneHPFit_Nom

Parametric Heat Pump calculation

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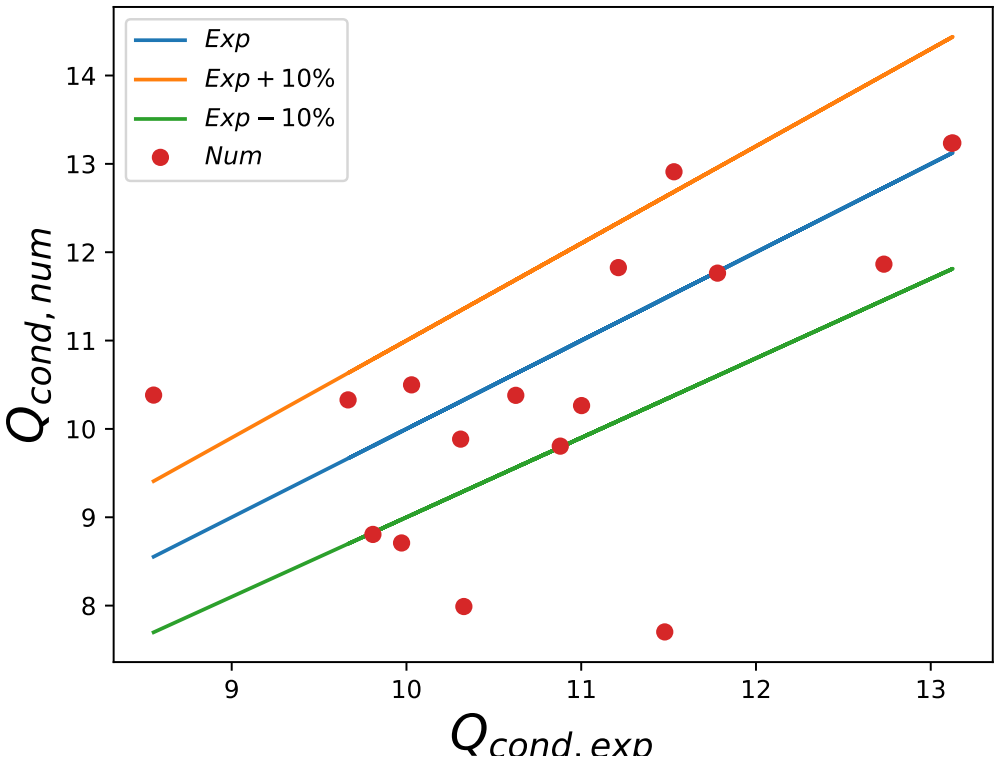

Figure 1: Q_{cond} differences between experiments and fitted data

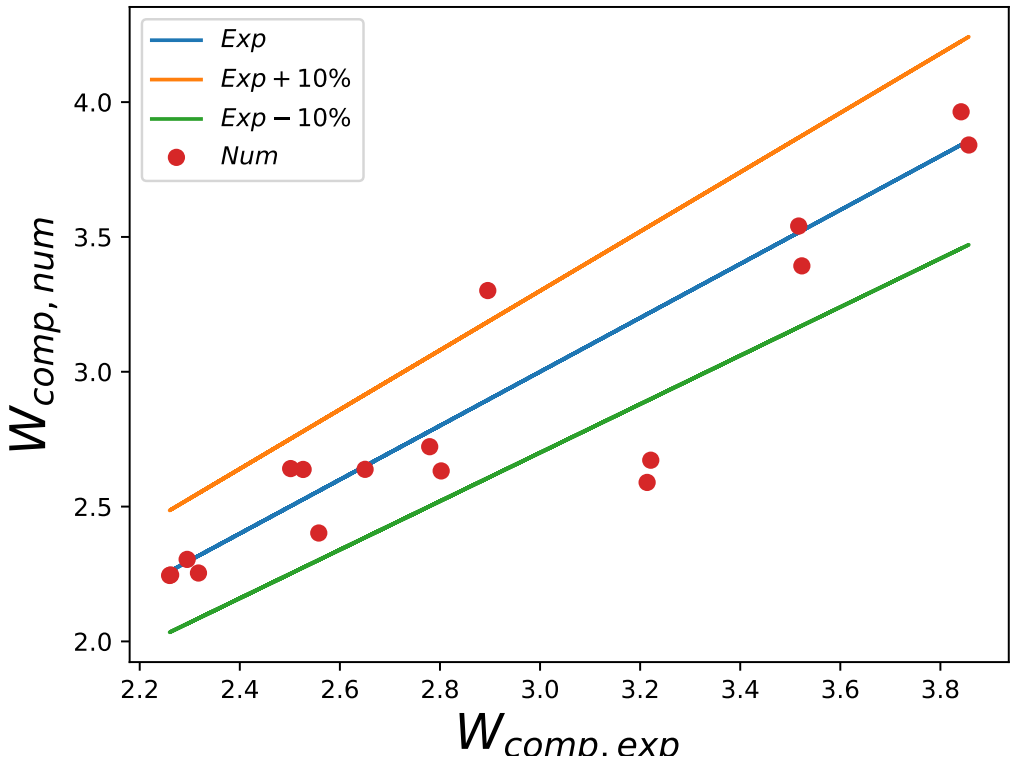

Figure 2: W_{comp} differences between experiments and fitted data

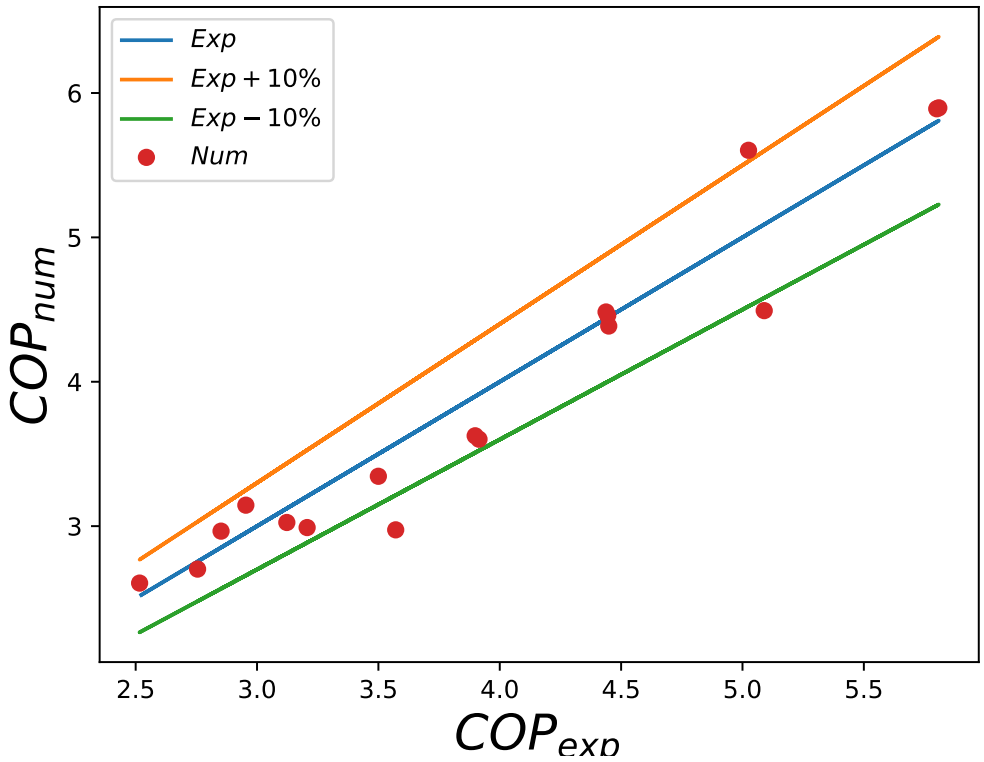

Figure 3: COP differences between experiments and fitted data

Table 1: Fitted coefficients for the heat pump.

Coefficient	Description	$[kW]$
P_{Q_1}	1^{st} *condenser polynomial coefficient*	-1.5692e+02
P_{Q_2}	2^{nd} *condenser polynomial coefficient*	-2.7728e+02
P_{Q_3}	3^{rd} *condenser polynomial coefficient*	1.3044e+03
P_{Q_4}	4^{th} *condenser polynomial coefficient*	1.0810e+03
P_{Q_5}	5^{th} *condenser polynomial coefficient*	-1.0732e+02
P_{Q_6}	6^{th} *condenser polynomial coefficient*	-2.5449e+03
P_{COP_1}	1^{st} *COP polynomial coefficient*	-3.4982e+01
P_{COP_2}	2^{nd} *COP polynomial coefficient*	-5.9597e+01
P_{COP_3}	3^{rd} *COP polynomial coefficient*	3.2759e+02
P_{COP_4}	4^{th} *COP polynomial coefficient*	2.6986e+02
P_{COP_5}	5^{th} *COP polynomial coefficient*	-1.3583e+01
P_{COP_6}	6^{th} *COP polynomial coefficient*	-7.0015e+02
$\dot{m}_{cond}$	2314.29 $[kg/h]$	
$\dot{m}_{evap}$	53.02 $[kg/h]$	
COP_{nom} (A0W35)	-5.67	
$Q_{cond,nom}$ (A0W35)	-36.39 $[kW]$	
$Q_{evap,nom}$ (A0W35)	-42.81 $[kW]$	
$W_{comp,nom}$ (A0W35)	6.42 $[kW]$	
RMS_{COP}	$2.85e-01$	
$RMS_{Q_{cond}}$	$1.36e+00$	
$RMS_{W_{comp}}$	$2.40e-01$	
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 $[\%]$
45.22	9.98	4.46	4.44	0.3	11.76	11.78	0.1	2.64	2.65	0.46
45.00	5.00	3.60	3.91	8.0	9.81	10.88	9.9	2.72	2.78	2.06
54.97	4.99	2.99	3.21	6.7	7.99	10.33	22.6	2.67	3.22	17.05
60.04	4.98	2.97	2.85	4.0	10.50	10.03	4.7	3.54	3.52	0.67
40.01	5.01	4.48	4.44	1.0	11.83	11.21	5.5	2.64	2.53	4.40
35.04	5.02	5.60	5.02	11.5	12.91	11.53	12.0	2.30	2.29	0.41
55.01	10.03	2.97	3.57	16.7	7.70	11.48	32.9	2.59	3.21	19.43
60.04	10.02	3.03	3.12	3.1	10.26	11.00	6.7	3.39	3.52	3.70
65.06	10.02	2.70	2.76	1.9	10.38	10.63	2.3	3.84	3.86	0.41
35.03	10.01	5.89	5.80	1.6	13.23	13.12	0.9	2.25	2.26	0.68
65.01	4.99	2.61	2.52	3.5	10.33	9.67	6.9	3.96	3.84	3.20
34.98	9.99	5.90	5.81	1.5	13.24	13.13	0.8	2.24	2.26	0.67
40.01	9.98	4.49	5.09	11.7	11.86	12.73	6.8	2.64	2.50	5.57
34.99	0.30	4.39	4.45	1.4	9.88	10.31	4.1	2.25	2.32	2.75
45.02	0.29	3.35	3.50	4.4	8.81	9.81	10.2	2.63	2.80	6.07
40.01	0.32	3.63	3.90	7.0	8.71	9.97	12.7	2.40	2.56	6.09
54.99	0.35	3.15	2.95	6.5	10.38	8.55	21.4	3.30	2.90	14.01
Sum				91.0			160.5			87.63
RMS_{COP}	$2.85e-01$									
$RMS_{Q_{cond}}$	$1.36e+00$									
$RMS_{W_{comp}}$	$2.40e-01$									