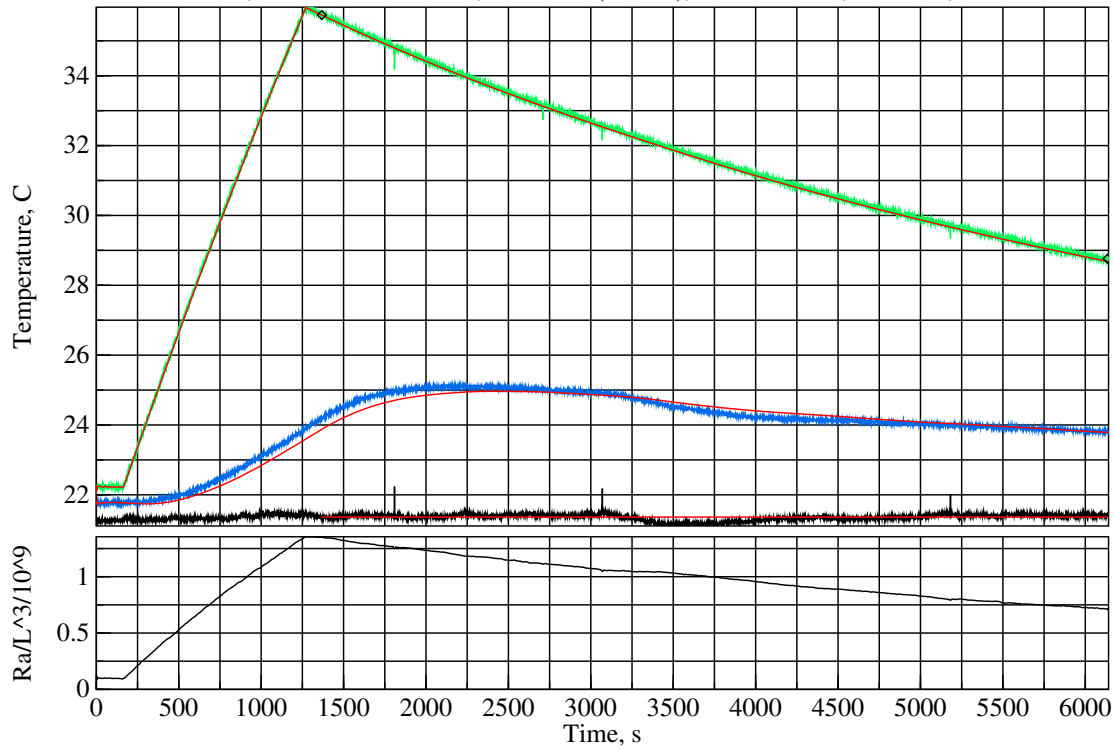


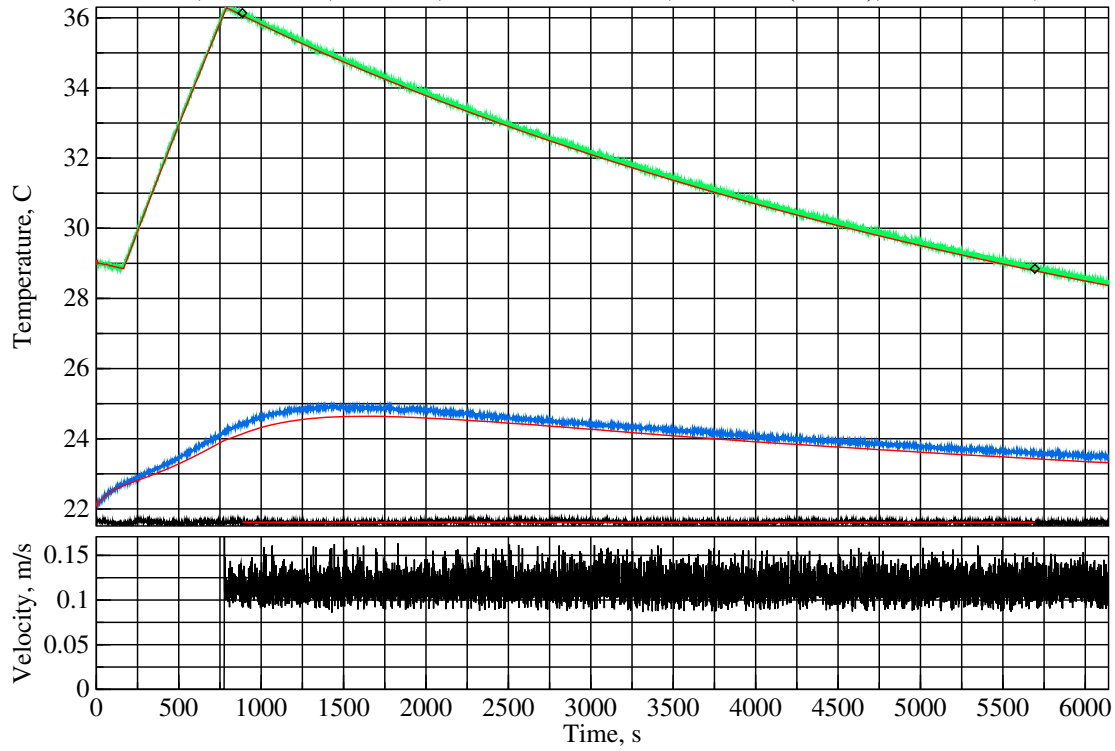
20170702T234939Z – mixed Convection – Roughness=1.04mm; T=21.4+10.4°C; –90.00°
k=0.0257, Ra/L^3=0.996x10^9, h=4.91W/(K.m^2), U=0.457W/K, Nu=58.3, Pr=0.710



Estimated measurement uncertainties of natural convection at $\theta = -90.0$.

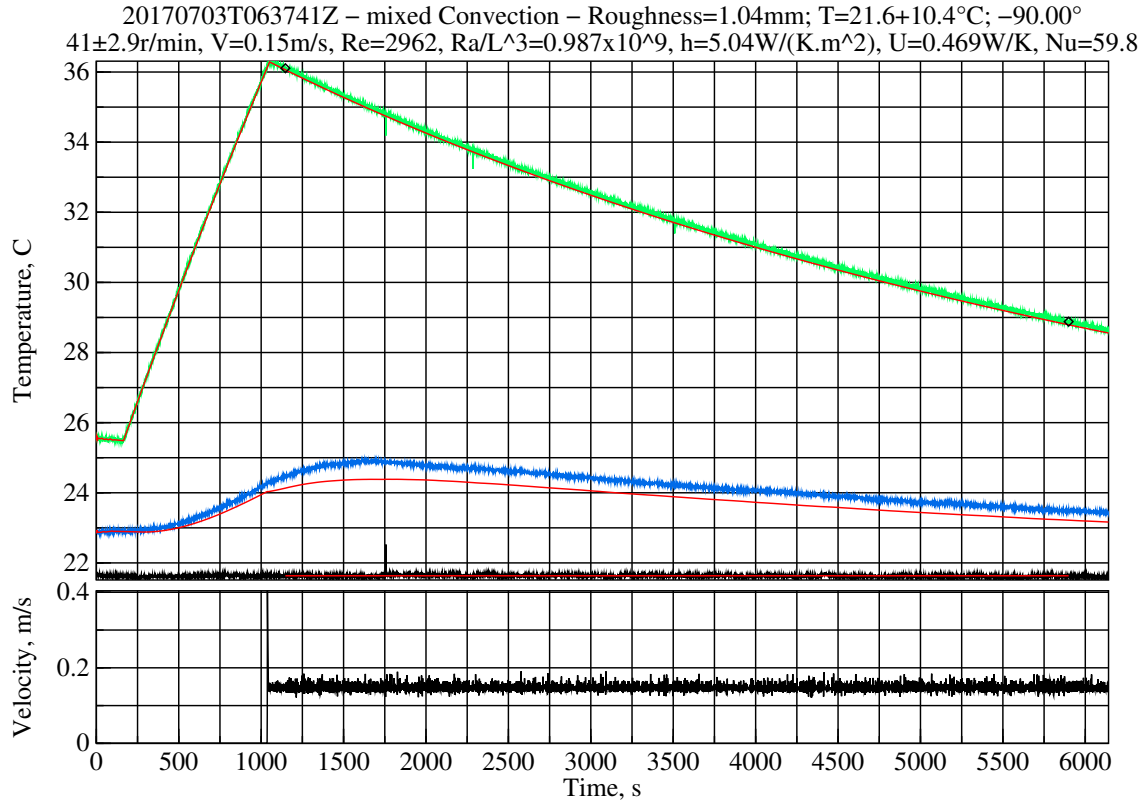
Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
ΔT	10.4K	+14.6%/K	0.10K	1.46%	LM35C differential
P	101kPa	+0.0005%/Pa	1.5kPa	0.80%	MPXH6115A6U air pressure
C_{pt}	4.24kJ/K	+0.030%/(J/K)	42J/K	1.25%	plate thermal capacity
C_S	1.000	–35.9%	0.050	1.80%	side reuptake
C_B	1.000	–10.7%	0.100	1.07%	back reuptake
L_m	3.57mm	+542%/m	500um	0.27%	side metal strip width
ϵ_{XPS}	0.515	+47.6%	0.010	0.48%	XPS emissivity
ϵ_{rs}	0.040	+109%	0.010	1.09%	test-surface emissivity
ϵ_{wt}	0.900	+34.2%	0.025	0.86%	wind-tunnel emissivity
				3.31%	combined bias uncertainty

20170703T034246Z – mixed Convection – Roughness=1.04mm; T=21.6+10.4°C; -90.00°
32±4.1r/min, V=0.12m/s, Re=2317, Ra/L^3=0.989x10^9, h=5.01W/(K.m^2), U=0.466W/K, Nu=59.4



Estimated measurement uncertainties, bi-level 1mm roughness at $Re = 2317$.

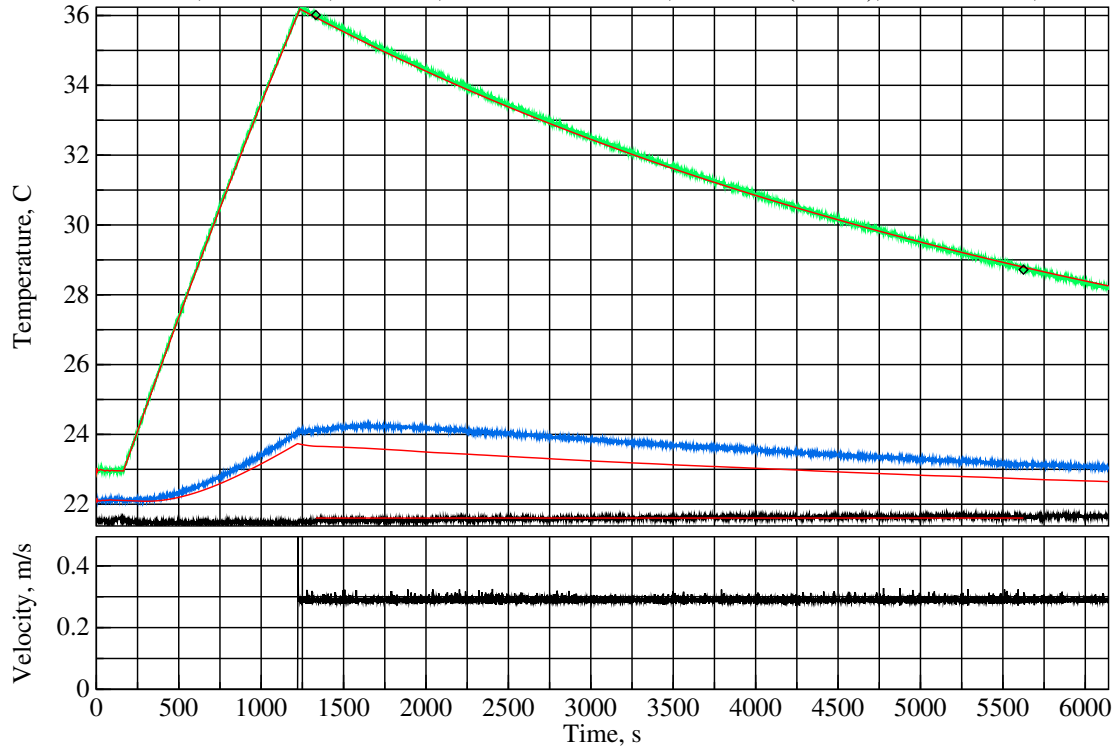
Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
ΔT	10.4K	+14.6%/K	0.10K	1.46%	LM35C differential
P	101kPa	+0.0005%/Pa	1.5kPa	0.82%	MPXH6115A6U air pressure
C_{pt}	4.24kJ/K	+0.030%/(J/K)	42J/K	1.25%	plate thermal capacity
C_S	1.000	-35.3%	0.050	1.77%	side reuptake
C_B	1.000	-11.4%	0.100	1.14%	back reuptake
L_m	3.57mm	+591%/m	500um	0.30%	side metal strip width
ϵ_{XPS}	0.515	+46.9%	0.010	0.47%	XPS emissivity
ϵ_{rs}	0.040	+107%	0.010	1.07%	test-surface emissivity
ϵ_{wt}	0.900	+33.7%	0.025	0.84%	wind-tunnel emissivity
				3.32%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	32.0r/min	+0.119%/(r/min)	4.1r/min	0.49%	fan rotation rate
				3.47%	RSS combined uncertainty



Estimated measurement uncertainties, bi-level 1mm roughness at $Re = 2962$.

Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
ΔT	10.4K	+14.5%/K	0.10K	1.45%	LM35C differential
P	101kPa	+0.0006%/Pa	1.5kPa	0.84%	MPXH6115A6U air pressure
C_{pt}	4.24kJ/K	+0.030%/(J/K)	42J/K	1.25%	plate thermal capacity
C_S	1.000	–35.0%	0.050	1.75%	side reuptake
C_B	1.000	–11.7%	0.100	1.17%	back reuptake
L_m	3.57mm	+605%/m	500um	0.30%	side metal strip width
ϵ_{XPS}	0.515	+46.4%	0.010	0.46%	XPS emissivity
ϵ_{rs}	0.040	+106%	0.010	1.06%	test-surface emissivity
ϵ_{wt}	0.900	+33.4%	0.025	0.83%	wind-tunnel emissivity
				3.32%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	41.0r/min	+0.150%/(r/min)	2.9r/min	0.43%	fan rotation rate
				3.43%	RSS combined uncertainty

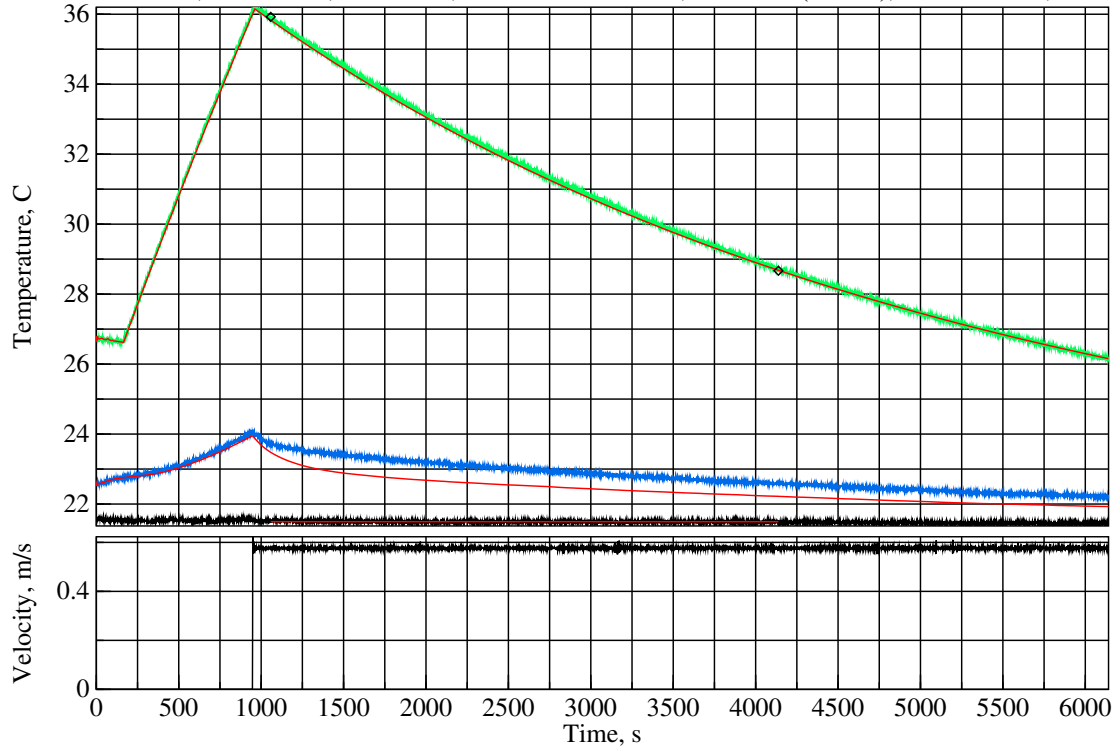
20170703T121949Z – mixed Convection – Roughness=1.04mm; T=21.6+10.3°C; –90.00°
80±2.2r/min, V=0.29m/s, Re=5808, Ra/L^3=0.985x10^9, h=5.72W/(K.m^2), U=0.532W/K, Nu=67.8



Estimated measurement uncertainties, bi-level 1mm roughness at $Re = 5809$.

Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
ΔT	10.3K	+14.0%/K	0.10K	1.40%	LM35C differential
P	101kPa	+0.0007%/Pa	1.5kPa	1.02%	MPXH6115A6U air pressure
C_{pt}	4.24kJ/K	+0.029%/(J/K)	42J/K	1.23%	plate thermal capacity
η	0.408	+65.5%	0.004	0.27%	anemometer calibration
C_S	1.000	–32.0%	0.050	1.60%	side reuptake
C_B	1.000	–11.5%	0.100	1.15%	back reuptake
ς	2.00mm	–2707%/m	100um	0.27%	post height
L_m	3.57mm	+634%/m	500um	0.32%	side metal strip width
ϵ_{XPS}	0.515	+42.2%	0.010	0.42%	XPS emissivity
ϵ_{rs}	0.040	+97.1%	0.010	0.97%	test-surface emissivity
ϵ_{wt}	0.900	+30.4%	0.025	0.76%	wind-tunnel emissivity
				3.23%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	80.3r/min	+0.332%/(r/min)	2.2r/min	0.72%	fan rotation rate
				3.54%	RSS combined uncertainty

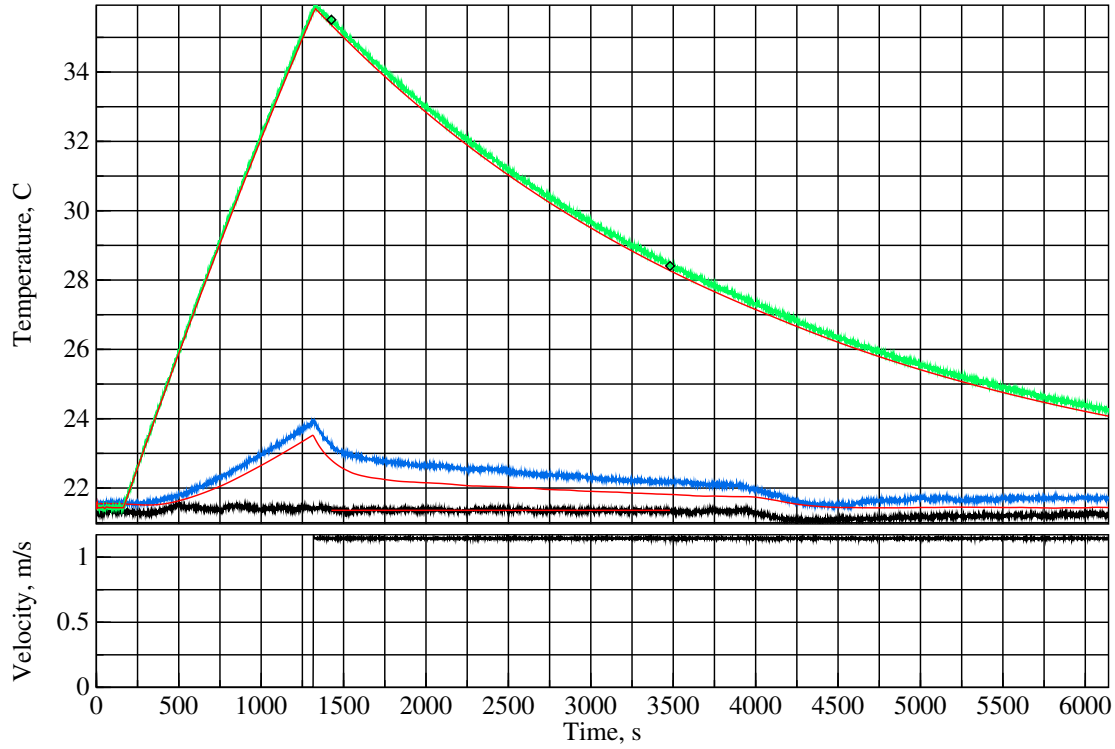
20170701T031434Z – mixed Convection – Roughness=1.04mm; T=21.5+10.4°C; –90.00°
160±1.0r/min, V=0.58m/s, Re=11562, Ra/L^3=0.993x10^9, h=7.99W/(K.m^2), U=0.743W/K, Nu=94.8



Estimated measurement uncertainties, bi-level 1mm roughness at $Re = 11562$.

Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
ΔT	10.4K	+13.1%/K	0.10K	1.31%	LM35C differential
P	101kPa	+0.0009%/Pa	1.5kPa	1.30%	MPXH6115A6U air pressure
C_{pt}	4.24kJ/K	+0.029%/(J/K)	42J/K	1.24%	plate thermal capacity
η	0.408	+162%	0.004	0.66%	anemometer calibration
C_S	1.000	–23.2%	0.050	1.16%	side reuptake
C_B	1.000	–8.80%	0.100	0.88%	back reuptake
L_T	8.34mm	+5200%/m	100um	0.52%	post length
ς	2.00mm	–9896%/m	100um	0.99%	post height
L_m	3.57mm	+730%/m	500um	0.36%	side metal strip width
ϵ_{tp}	0.860	+19.5%	0.015	0.29%	tape emissivity
Ω_{tp}	0.540	+12.1%	0.020	0.24%	tape coverage
ϵ_{rs}	0.040	+70.3%	0.010	0.70%	test-surface emissivity
ϵ_{wt}	0.900	+31.0%	0.025	0.77%	wind-tunnel emissivity
				3.20%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	160r/min	+0.414%/(r/min)	0.95r/min	0.39%	fan rotation rate
				3.29%	RSS combined uncertainty

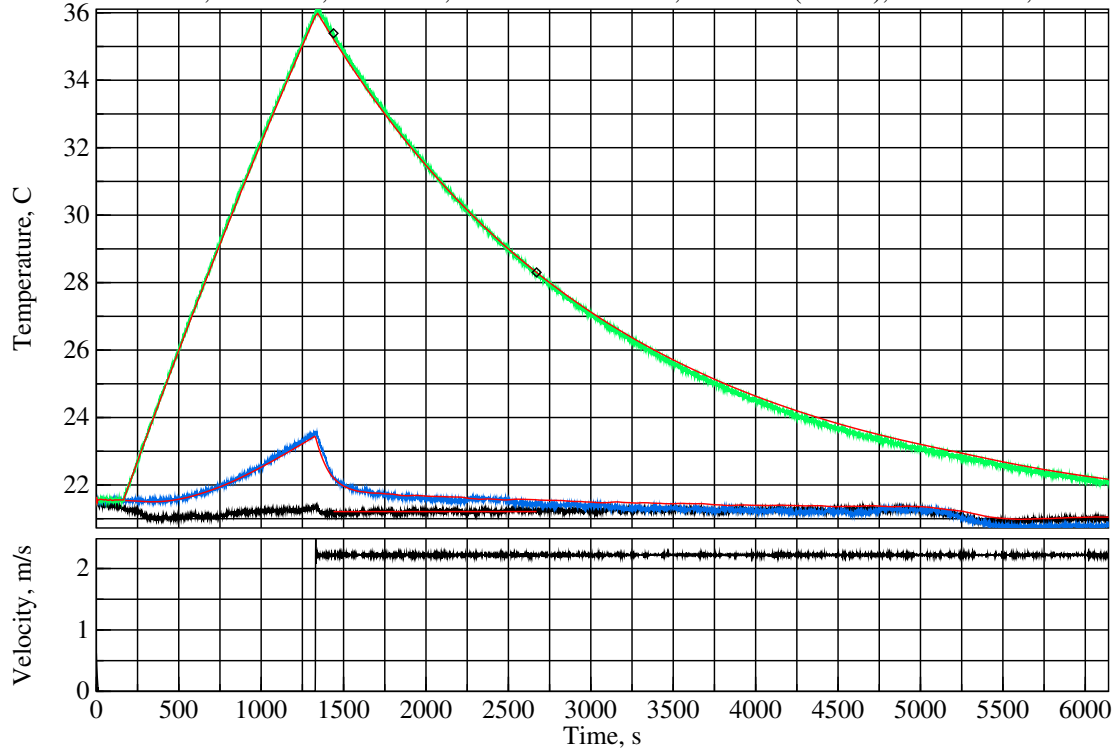
20170701T152213Z – mixed Convection – Roughness=1.04mm; T=21.4+10.2°C; -90.00°
320±1.0r/min, V=1.1m/s, Re=22966, Ra/L^3=0.979x10^9, h=12.9W/(K.m^2), U=1.20W/K, Nu=152.5



Estimated measurement uncertainties, bi-level 1mm roughness at $Re = 22968$.

Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
ΔT	10.2K	+11.7%/K	0.10K	1.17%	LM35C differential
P	101kPa	+0.0009%/Pa	1.5kPa	1.29%	MPXH6115A6U air pressure
C_{pt}	4.24kJ/K	+0.027%/(J/K)	42J/K	1.15%	plate thermal capacity
η	0.408	+196%	0.004	0.80%	anemometer calibration
C_S	1.000	-13.8%	0.050	0.69%	side reuptake
C_B	1.000	-5.44%	0.100	0.54%	back reuptake
L_T	8.34mm	+8142%/m	100um	0.81%	post length
ς	2.00mm	-6820%/m	100um	0.68%	post height
L_m	3.57mm	+561%/m	500um	0.28%	side metal strip width
ϵ_{rs}	0.040	+41.8%	0.010	0.42%	test-surface emissivity
ϵ_{wt}	0.900	+18.3%	0.025	0.46%	wind-tunnel emissivity
				2.73%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	320r/min	+0.250%/(r/min)	1.0r/min	0.26%	fan rotation rate
				2.78%	RSS combined uncertainty

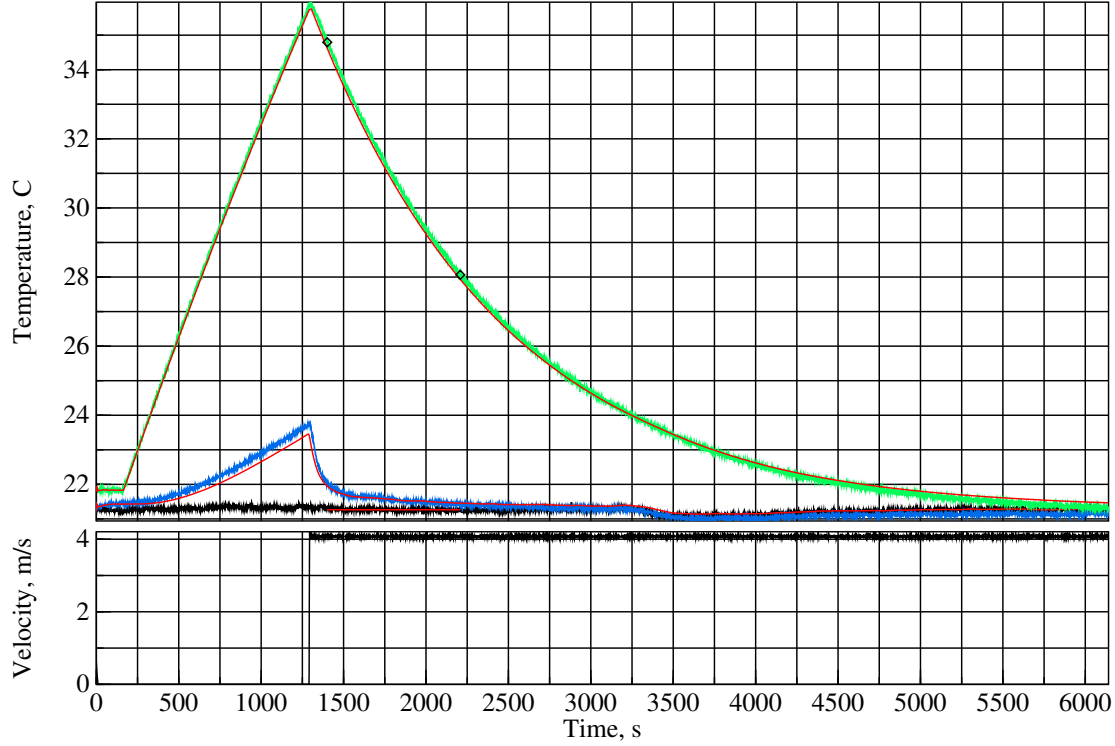
20170701T212313Z – mixed Convection – Roughness=1.04mm; T=21.2+10.2°C; -90.00°
640±4.3r/min, V=2.2m/s, Re=44524, Ra/L^3=0.977x10^9, h=22.7W/(K.m^2), U=2.11W/K, Nu=269.5



Estimated measurement uncertainties, bi-level 1mm roughness at $Re = 44517$.

Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
ΔT	10.2K	+10.9%/K	0.10K	1.09%	LM35C differential
P	100kPa	+0.0008%/Pa	1.5kPa	1.22%	MPXH6115A6U air pressure
C_{pt}	4.24kJ/K	+0.026%/(J/K)	42J/K	1.09%	plate thermal capacity
η	0.408	+183%	0.004	0.75%	anemometer calibration
C_S	1.000	-8.04%	0.050	0.40%	side reuptake
C_B	1.000	-3.26%	0.100	0.33%	back reuptake
L_T	8.34mm	+9040%/m	100um	0.90%	post length
ς	2.00mm	-2848%/m	100um	0.28%	post height
L_m	3.57mm	+467%/m	500um	0.23%	side metal strip width
ϵ_{rs}	0.040	+24.4%	0.010	0.24%	test-surface emissivity
ϵ_{wt}	0.900	+10.6%	0.025	0.27%	wind-tunnel emissivity
				2.42%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	640r/min	+0.117%/(r/min)	4.3r/min	0.51%	fan rotation rate
				2.62%	RSS combined uncertainty

20170701T231830Z – mixed Convection – Roughness=1.04mm; T=21.3+09.8°C; -90.00°
1280±6.3r/min, V=4.1m/s, Re=81697, Ra/L^3=0.941x10^9, h=36.2W/(K.m^2), U=3.37W/K, Nu=429.4



Estimated measurement uncertainties, bi-level 1mm roughness at $Re = 81699$.

Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
ΔT	9.80K	+10.9%/K	0.10K	1.09%	LM35C differential
P	100kPa	+0.0008%/Pa	1.5kPa	1.18%	MPXH6115A6U air pressure
C_{pt}	4.24kJ/K	+0.025%/(J/K)	42J/K	1.06%	plate thermal capacity
η	0.408	+142%	0.004	0.58%	anemometer calibration
u_u	7.910	+2.65%	0.100	0.26%	diffuser airflow upper bound
C_S	1.000	-4.94%	0.050	0.25%	side reuptake
C_B	1.000	-2.04%	0.100	0.20%	back reuptake
L_T	8.34mm	+9290%/m	100um	0.93%	post length
L_m	3.57mm	+438%/m	500um	0.22%	side metal strip width
				2.28%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	1.28kr/min	+0.053%/(r/min)	6.3r/min	0.34%	fan rotation rate
				2.38%	RSS combined uncertainty