

Room air and comfort report

Sample: small office (steady) · Job CF-SAMPLE-ROOM · 19 Oct 2026

Important: this report is not binding

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Job and inputs

Analysis	Steady (averaged): room averages, local values as a range
Room	4.5 x 4 x 2.8 m (50.4 m ³)
Supply air	540 m ³ /h, 10.71 air changes per hour
Heat loads	people 225 W, equipment 300 W, solar 360 W
Mesh	109,551 cells, Draft: medium mesh (for early design comparisons)
Model	steady RANS kEpsilon, Boussinesq buoyancy, 6080 iterations; running average from iteration 5049

Result: room averages (occupied zone, 0.5 m from the walls)

Air speed at 1.1 m (seated head), mean	0.09 m/s
Air speed at 0.1 m (ankle), mean	0.18 m/s
Head-ankle temperature difference, mean	0.40 K
PMV / PPD at 1.1 m (ISO 7730)	PMV -0.313, PPD 8.07 %
ADPI (ASHRAE 113)	85.2 %
Air-change effectiveness at 1.1 m	1.093

These averages are stable: across the final 2 reads of the run they stayed within air speed at 1.1 m, mean 0.094 m/s; pmv at 1.1 m, mean -0.313 PMV; adpi 85.200 %.

Local values are a range, not a single number

A steady simulation of a heated, ventilated room does not settle on one flow: the averaged room values above stop moving, but the fastest air and the worst head-ankle temperature difference keep drifting slowly with the iteration at which the run is read. They are therefore given as the range over the final reads. Where a range straddles a limit, the pass/fail depends on the read and is not decided here.

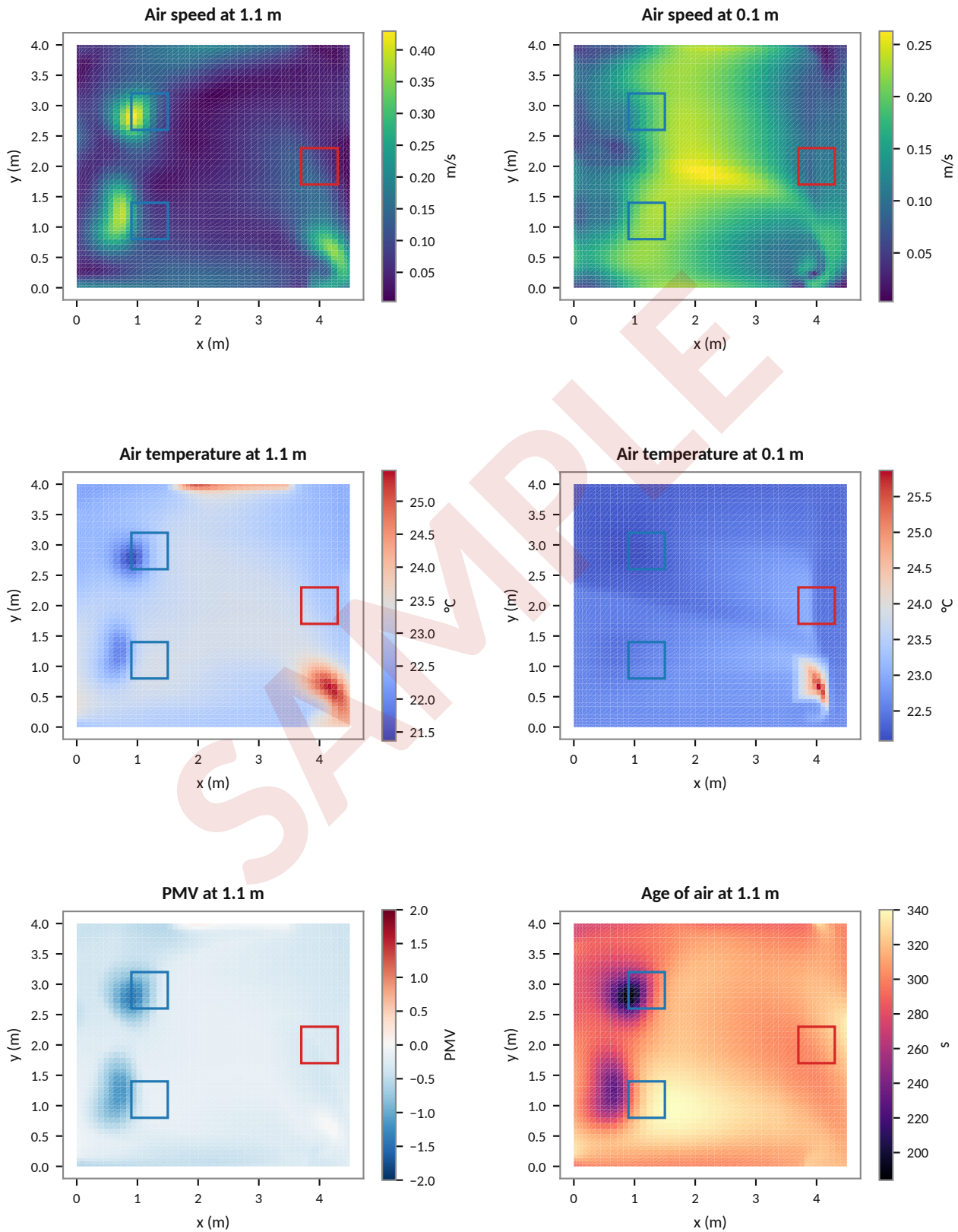
Local extremes (flagged: unsteady)

Air speed at 1.1 m, highest	0.43 to 0.43 m/s (range over the final reads)
Air speed at 0.1 m, highest	0.26 m/s (range over the final reads)
Head-ankle temperature difference, worst column	0.80 to 0.80 K (range over the final reads)
ISO 7730 category B, head-ankle below 3 K	meets the 3 K limit at every read (0.80 to 0.80 K)

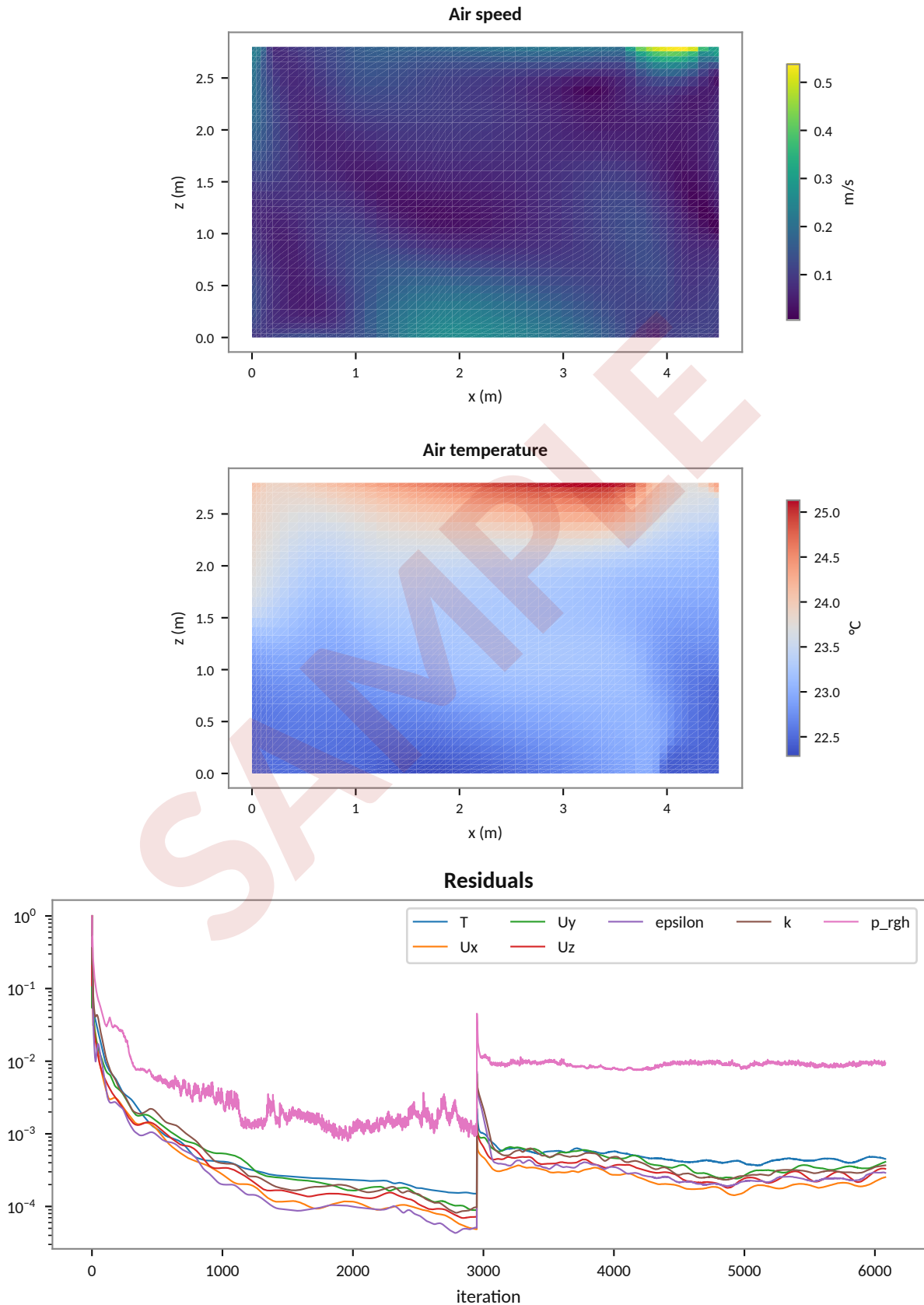
How the run ended

Stopped at iteration 6080: the running averages (from iteration 5049) of the air temperatures and speeds at the monitor points held within 0.1 K and 0.02 m/s for 200 iterations. Residuals at stop: U 4.1e-04, T 4.5e-04, p_rgh 9.4e-03, epsilon 2.9e-04, k 3.7e-04 (targets: p 0.0001, others 0.001). This is a settled answer, not a residual-converged one. Over iterations 5,080-6,080 the whole room's mean temperature changed by -0.040 K (limit 0.05 K) and the mean air speed by -0.0006 m/s (limit 0.00242); the room as a whole had stopped drifting (local values can still move, see the ranges).

Plan views (supply openings blue, returns red)



Vertical section through the room centre (along x)



Reads of the averaged result

The averaged fields are read every 500 iterations while the solver runs. The final reads (2: those with at least 500 iterations averaged since the average started at iteration 5049, plus the final result) give the ranges on page 1.

iteration	mean speed 1.1 m	highest speed 1.1 m	highest speed 0.1 m	worst head-ankle ΔT (K)	PMV	ADPI %	in the range
5500	0.094	0.432	0.262	0.80	-0.309	84.6	no
6000	0.094	0.430	0.263	0.80	-0.313	85.2	yes

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What this simulation does and does not include

Validation

Validated against three published benchmark rooms. Air-flow pattern and air speeds meet the published acceptance criteria. Temperatures in the occupied zone agree with measurements to within about 0.3 K, but did not meet the strict $\pm 5\%$ benchmark criterion in the heated-floor case. Air temperatures within a few centimetres of heated or cooled surfaces are less reliable. Radiation between surfaces is not modelled. Heat flow into or out of the room's surfaces is not a validated result.

Radiation is not modelled

Heat exchange by radiation between surfaces, people, windows and lights is not calculated. The mean radiant temperature used for PMV/PPD is taken equal to the air temperature, or, when you gave surface temperatures, estimated as the area-weighted average of those surfaces. Near large glazing or radiant heaters and coolers this can be wrong: next to hot glass people feel warmer than the PMV shown (the report is optimistic); next to cold glass they feel cooler than shown.

Steady, averaged flow

Room air never stands perfectly still. The results are the average of the flow over the last part of the run, after the start-up has cleared; short gusts and slow swings around that average are not shown. Room averages settle; local extremes (the fastest air, the worst head-ankle temperature difference) still move with the point at which a steady run is read, so they are given as a range.

What is in the room

Only the room, openings and heat loads you described are modelled. Furniture, partitions, people's bodies (other than as heat) and leakage through the building fabric are not, unless stated.

Mean radiant temperature used for PMV

taken equal to the local air temperature (surface temperatures not solved)

Wall treatment

First-cell y^+ on the room surfaces 1.4 to 44.5. The wall functions used are valid across that range (viscous sublayer to log layer); even so, air temperatures within a few centimetres of heated or cooled surfaces are less reliable.

Disclaimer

How it was made.

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Design guidance only, not certification. Results come from a steady RANS simulation with Boussinesq buoyancy of the room, openings and loads supplied; furniture, radiation between surfaces and transient effects are not modelled unless stated. Comfort indices follow ISO 7730 / ASHRAE 55 and are only shown where those standards apply. Verify critical values independently before relying on them for compliance or warranty decisions.

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