

CFD results report

Sample: 90° water bend · Job CF-SAMPLE · 13 Oct 2026

Important: this report is not binding

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Summary

We simulated steady water (liquid) flow through the pipe or fitting in your geometry (bend90.stl), with the inlet set to 4 m/s (a flow rate of 0.007832 m³/s). The headline result is a static pressure drop of 5,294 Pa from inlet to outlet: the pressure the flow loses passing through the part. The calculation converged after 226 iterations, so the solution is numerically stable.

Convergence: CONVERGED

Judged against: residual targets $p < 0.0001$, other residuals < 0.001 ; stop when settled: ON (static pressure drop change $< 0.5\%$ over 200 iterations).

Converged at iteration 226: every residual met its target (p 0.0001, others 0.001).

Headline results

Static pressure drop (inlet – outlet)	5,294 Pa
Total pressure drop	5,294 Pa
Loss coefficient K (inlet velocity)	0.663
Flow rate	0.007832 m ³ /s
Mean inlet velocity	4 m/s

Job and inputs

Application	Hydraulics / Pipe Network
Flow type	Internal flow through the uploaded fluid volume
Fluid	Water (liquid) ($\rho = 998 \text{ kg/m}^3$, $\nu = 1\text{e-}06 \text{ m}^2/\text{s}$)
Turbulence model	k- ω SST
Analysis package	Standard
Iterations run / budget	226 / 1500
Geometry file	bend90.stl

Boundary conditions

In	Velocity Inlet: 4 m/s
Out	Pressure Outlet: 0 Pa

Assumptions

- Steady state (simpleFoam, SIMPLE algorithm).
- Incompressible, isothermal (no heat transfer), single-phase Newtonian fluid.
- RANS turbulence (k- ω SST); near-wall flow resolved to $y^+ \approx 1$ with prism layers; walls smooth, no-slip.
- Inlet speed 4 m/s over the inlet area $0.001958 \text{ m}^2 = 0.007832 \text{ m}^3/\text{s}$.
- Internal flow through the uploaded fluid volume: 1 inlet, 1 outlet(s) at the outlet pressure, no-slip walls; cell size 4.99 mm, 2.49 mm at the walls (hydraulic diameter 49.89 mm).

Mesh and convergence

Mesh

Cells	913,825
Wall layers	$y^+ \approx 1$ (resolved sublayer), 100 % of wall faces
Mesh checks (checkMesh)	passed
Max non-orthogonality	54.87°
Max skewness	0.6225
Negative volumes	none

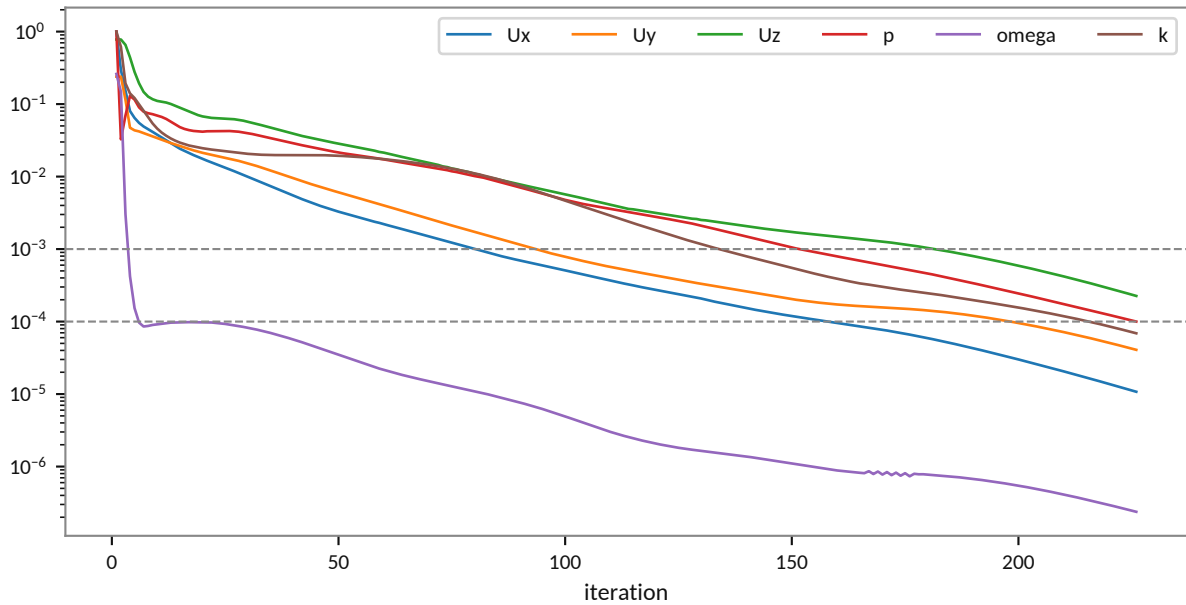
y+ on walls

Walls

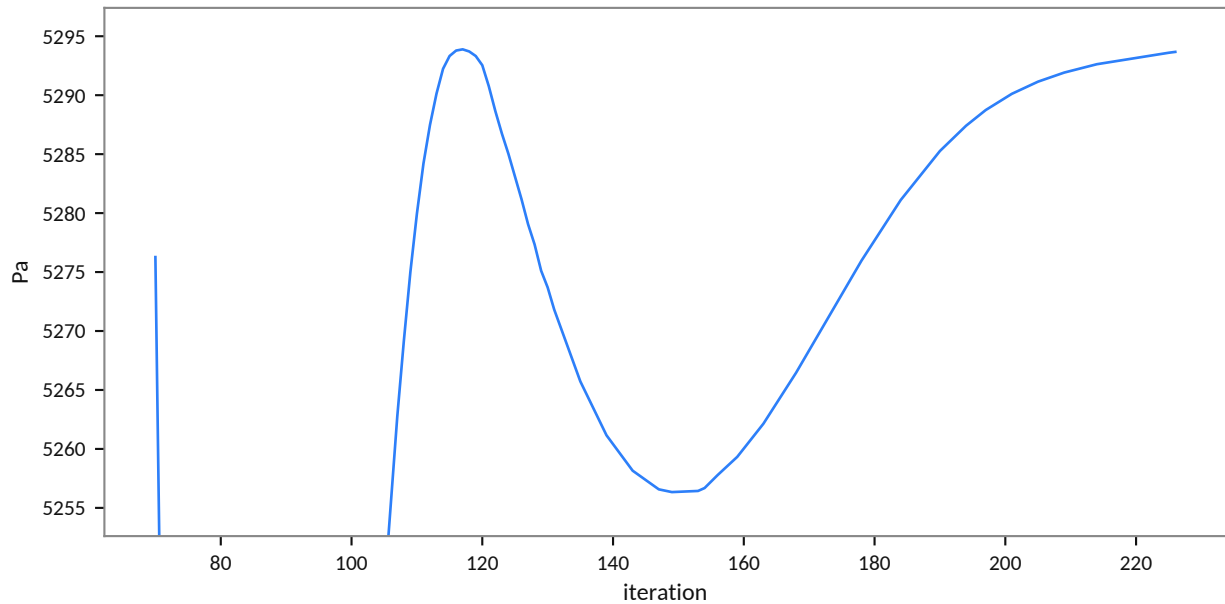
min 0.2735 · avg 1.042 · max 2.326

$y^+ \approx 1$: the viscous sublayer is resolved (low-Re wall treatment). $y^+ \approx 30-300$: wall functions model it. In between, the Spalding wall function blends the two.

Initial residuals (dashed: tolerance)

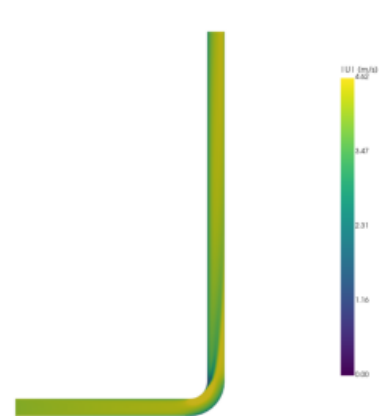


Monitored value: static pressure drop (moved 0.18% over the last 38 iterations)



Mid-plane fields

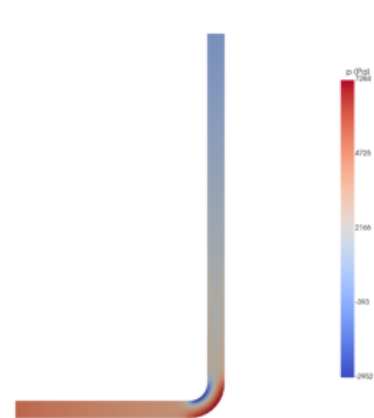
Velocity magnitude



Velocity, close-up of the fastest region



Static pressure (relative to the outlet)

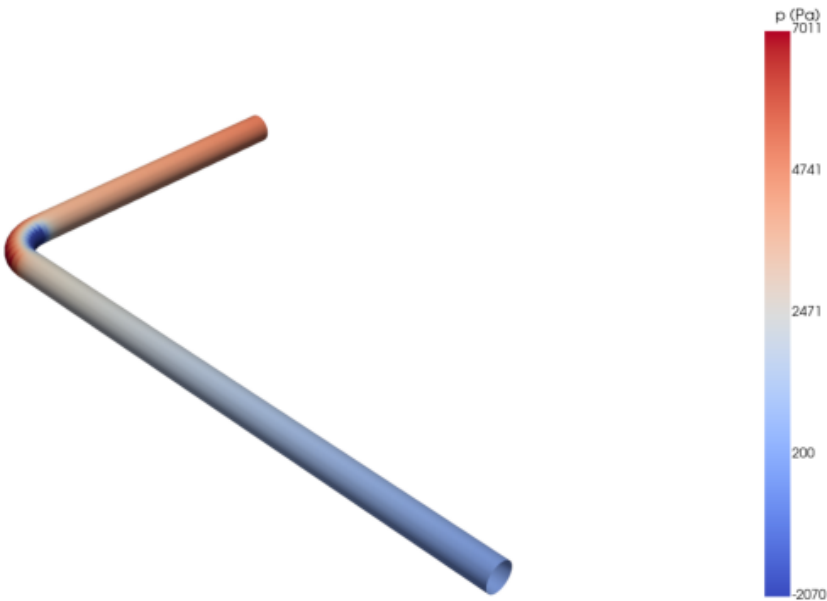


Pressure, close-up

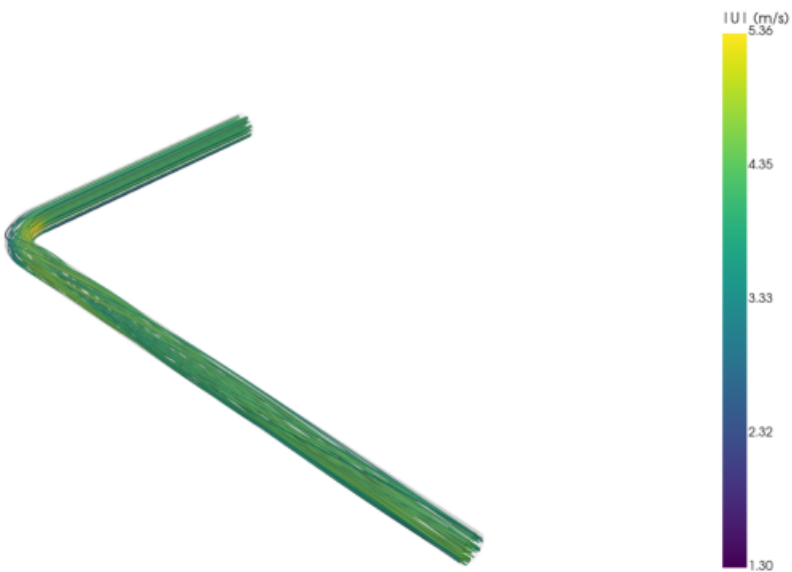


Surfaces and streamlines

Surface pressure



Streamlines coloured by speed



Disclaimer and limitations

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