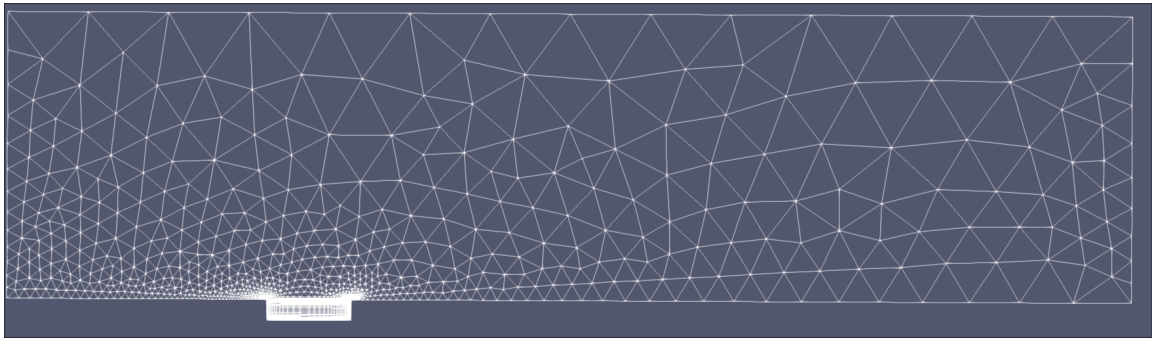
IMPERIAL

Sparser-mesh computations

Víctor Ballester
February 13, 2025

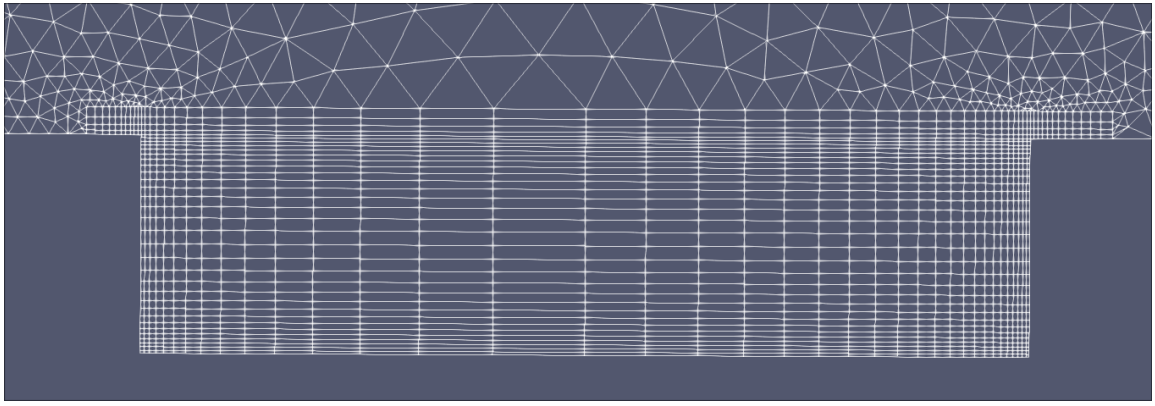
New mesh



Num elements: From ~ 24000 (with the previous mesh) to ~ 3000! One problem is that the downstream region is usually not well resolved.

Polynomial order for (**u**,p): (7,6) initially and then (9,8) to converge quicker to the Steady State solution.

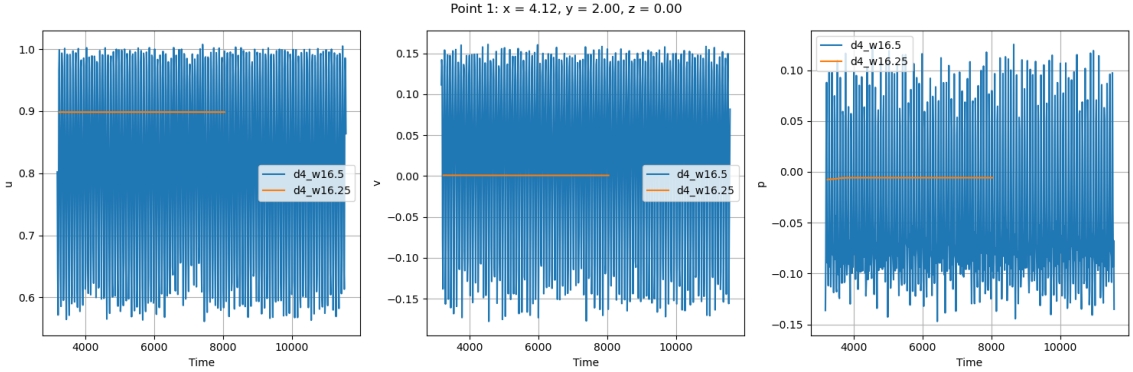
New mesh



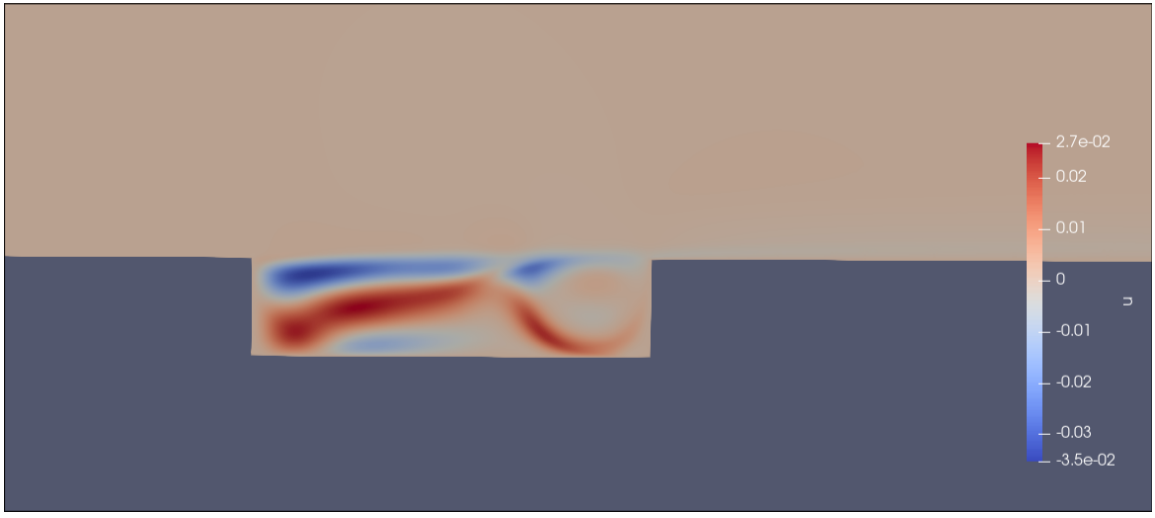
Stability results

Everything at $\mathrm{Re}_{\delta^*} = 1000$.

Using $\mathrm{D} = 4\delta^*$, the system with $\mathrm{w} = 16.25\delta^*$ is stable, but the system with $\mathrm{w} = 16.5\delta^*$ didn't stabilize (I run it till $\mathrm{t} = 11574$).

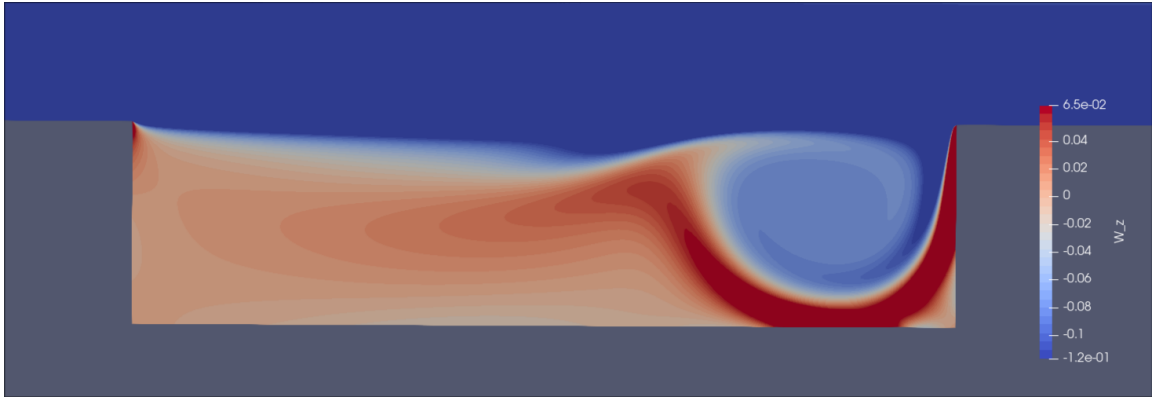


Stable node w $= 16.25\delta^*$



Baseflow w $= 16.25\delta^*$

Vorticity field.



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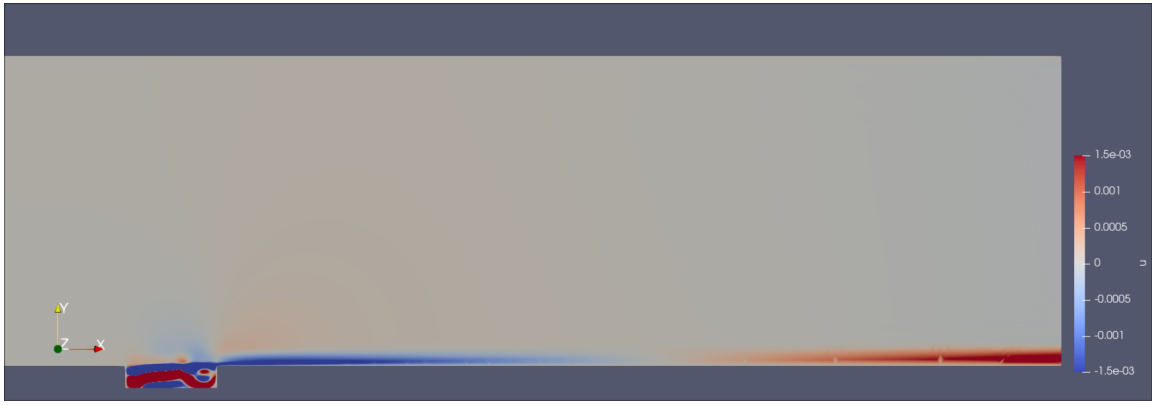

Does it look ok (the downstream region)?

Concerns about convergence

- I stopped the simulation in the steady state solution when the variation in the u component is less than 10^{-7}. In the linear NavierStokes I stop the computation of the eigenvectors when their residual is of the order of 10^{-5}.
- My concern is that the dependence in the domain aspect ratios is much higher than that. And probably the resolution of the smallest element as well (e.g. order of the polynomials). I want to check this. Any suggestions?