IMPERIAL

Domain sensitivity analysis

Víctor Ballester
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Summary

Our goal here is to determine the appropriate domain for which there is no dependence on the final solution in the length scales of the domain, say the x distance before and after the gap and the height of the domain.

Data

- $\text{Re}_{\delta^*} = 1000$
- $\text{D}/\delta^* = 4$
- $\text{W}/\delta^* = 15$

(for not forgetting it in the future) for Blasius profile $\delta = 2.85\delta^*$ (if the other text books say slightly different values, it is because they are using approximations. I computed the **exact** value.)

Domains considered

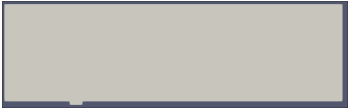
Coding system: ioh, where i, o, h $\in \{1, 2, 3\}$ and i is the inflow, o is the outflow and h is the height of the domain, and the numbers mean from small size (1) to large size (3).

133 (small inflow)

233 (medium inflow)

313 (small outflow)

323 (medium outflow)



333 (large everything)

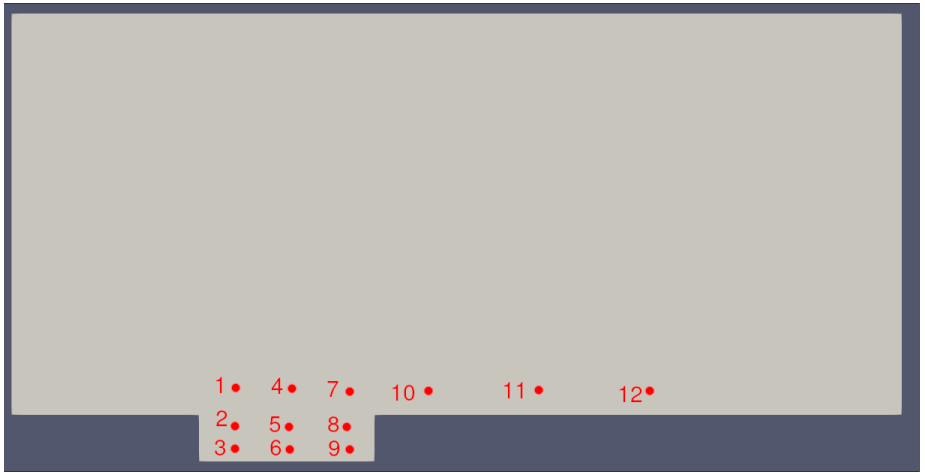
331 (small height)

332 (medium height)

original domain

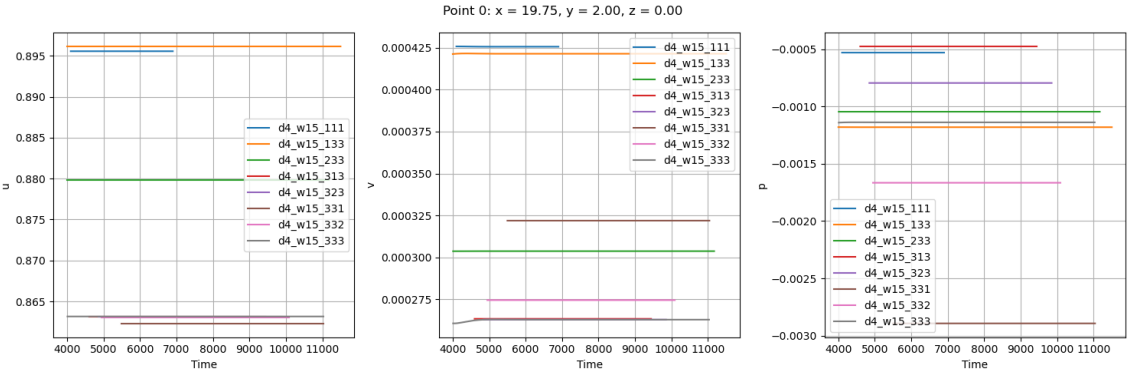
Points of interest

We fix some points in the domain to study their time evolution:



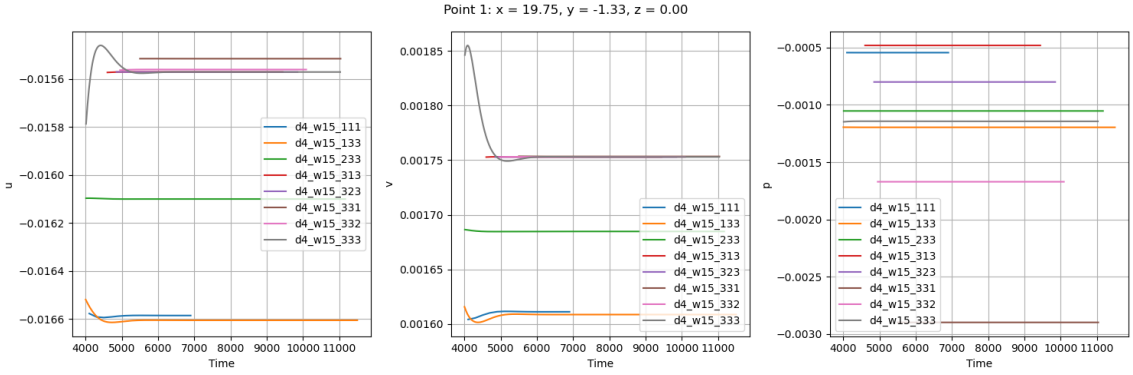
Results

Point 1:



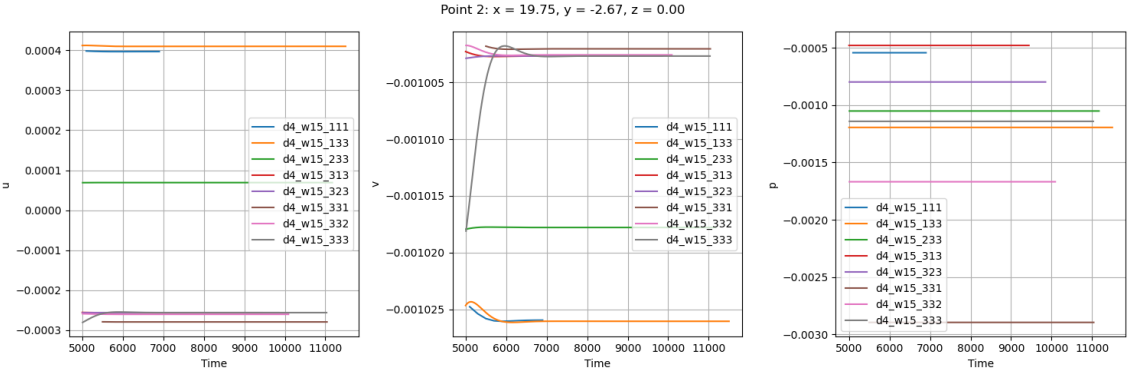
Results

Point 2:



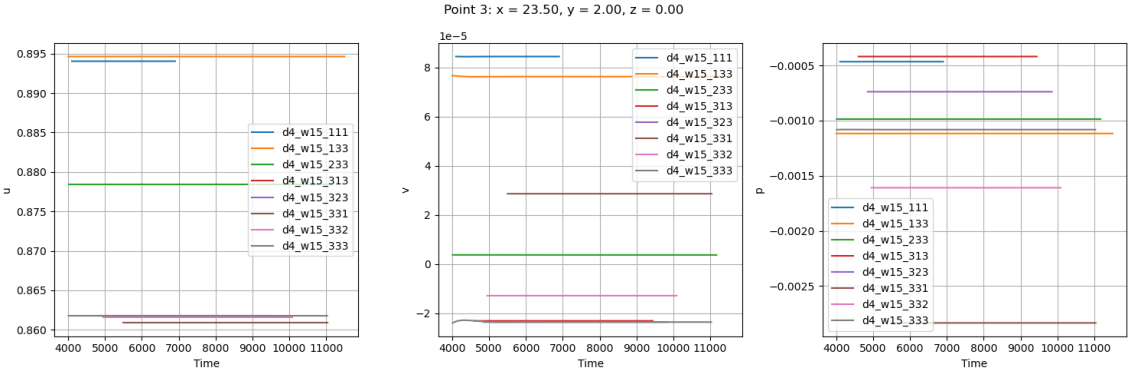
Results

Point 3:



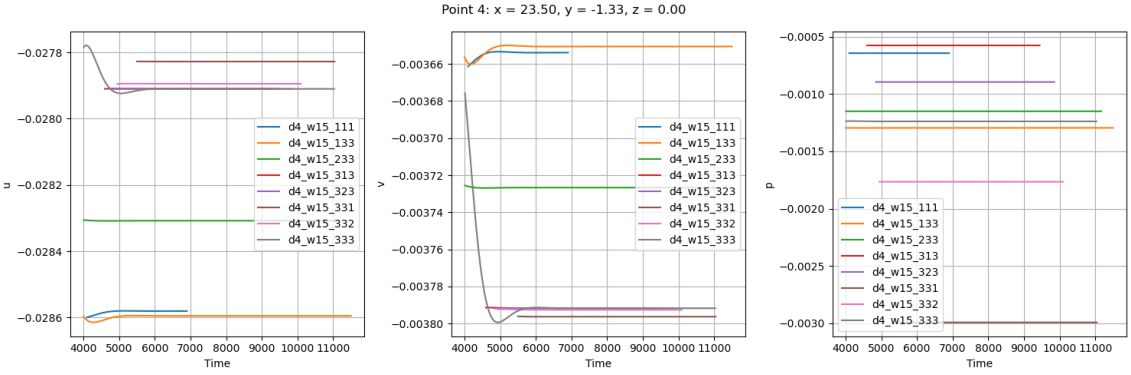
Results

Point 4:



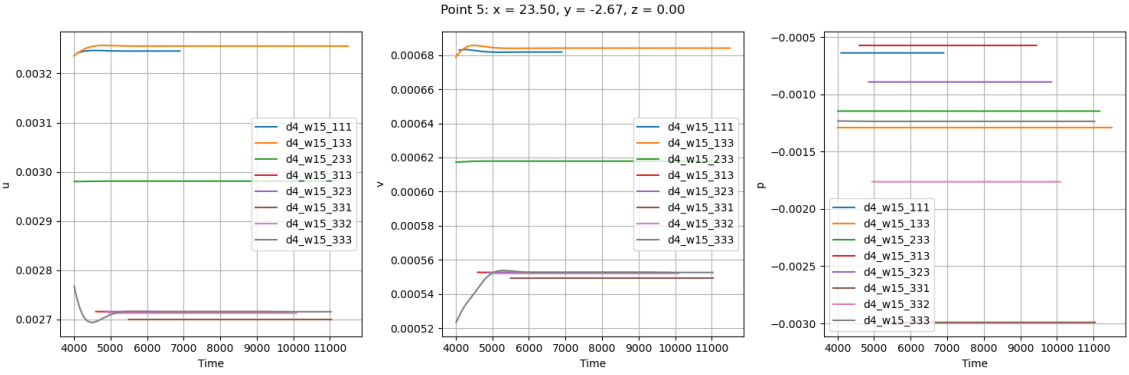
Results

Point 5:



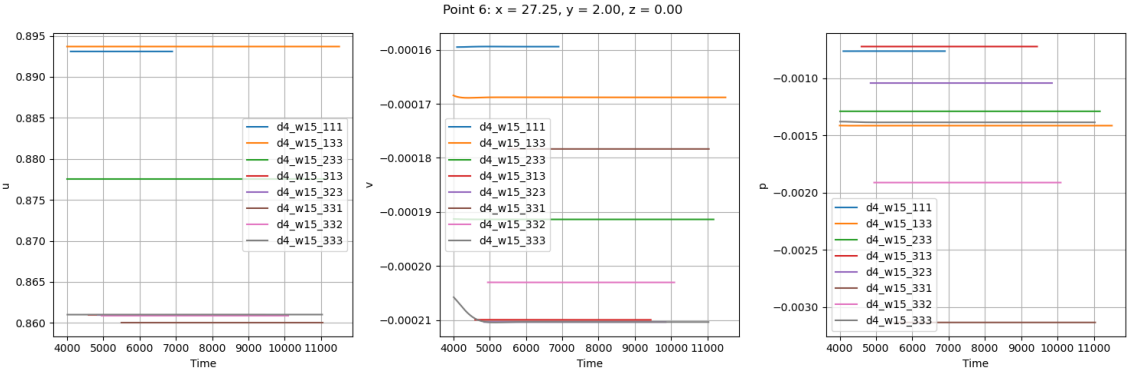
Results

Point 6:



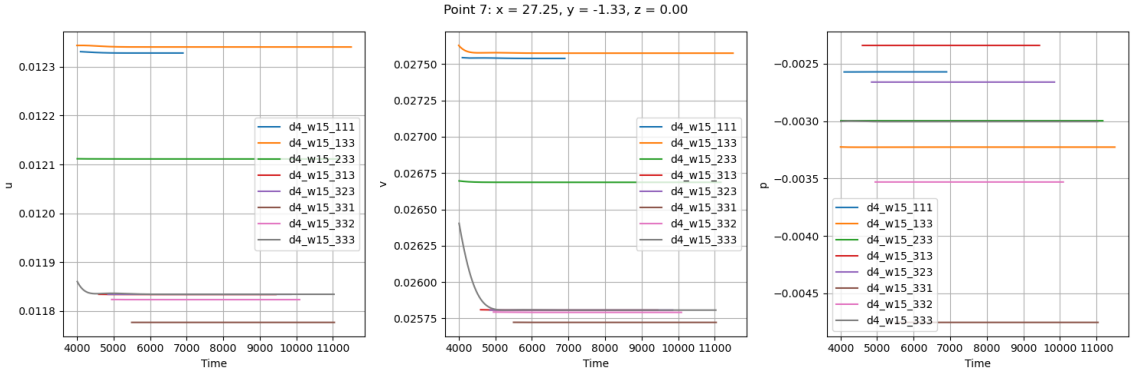
Results

Point 7:



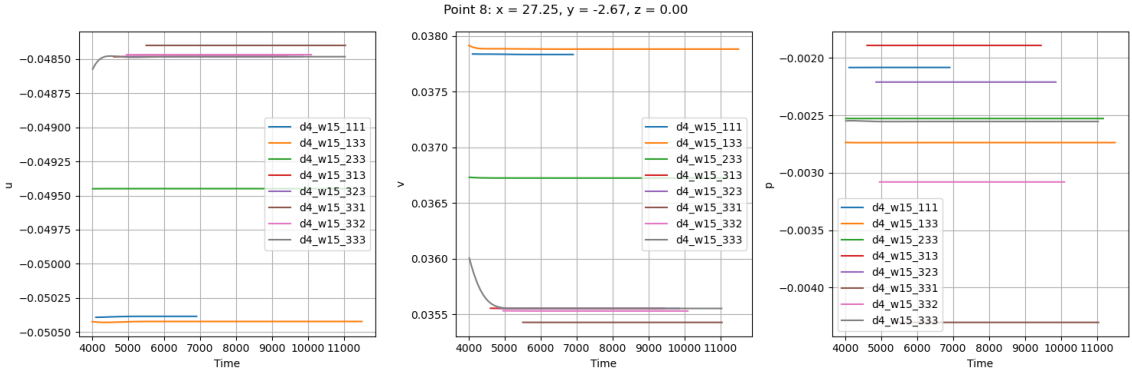
Results

Point 8:



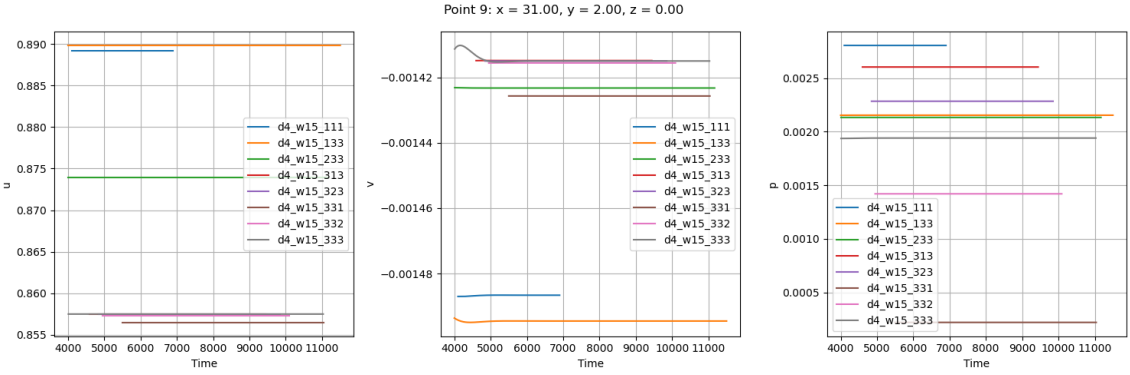
Results

Point 9:



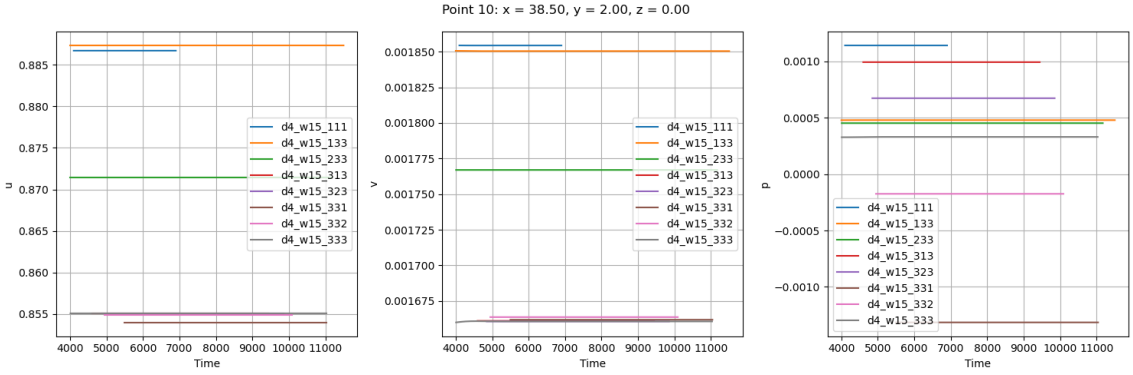
Results

Point 10:



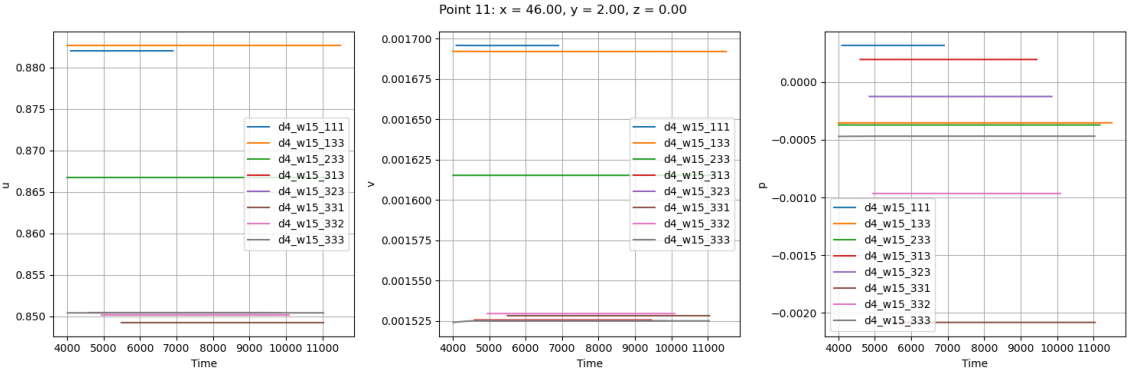
Results

Point 11:



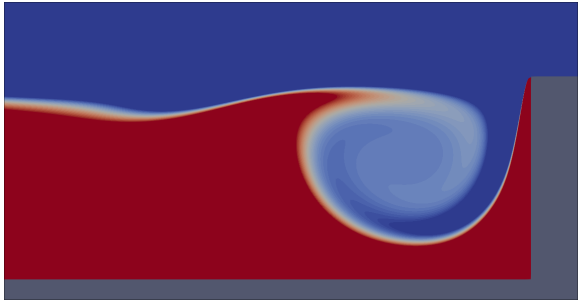
Results

Point 12:



Conclusions

- The distance after the gap is not that important for u and v.
- The pressure is the most sensitive to the domain size.



The resolution of the vortex was decent