

IMPERIAL

Exploring more depths

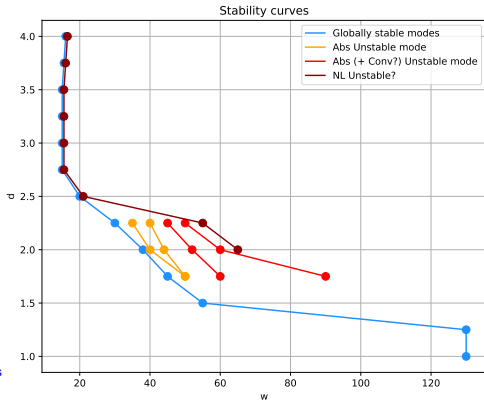
Víctor Ballester
April 30, 2025

General Comments

- I confirm, we may still have a subcritical bifurcation in the vicinity of $d = 4\delta^*$, $w = 16\delta^*$. I ran a perturbed system in an unstable configuration and I got a stable solution.
- Modified Arnoldi still doesn't output the TS mode for the stable case, now that the BC are (more) correct. We still get that huge mode. Should we go for blowing and suction?
- I ran a lot of runs varying $d/\delta^* \in [1, 4]$ and $w/\delta^* \in [15, 130]$.

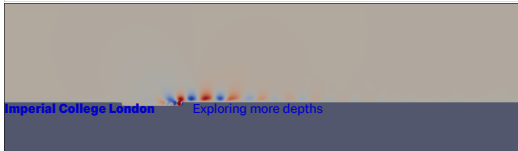
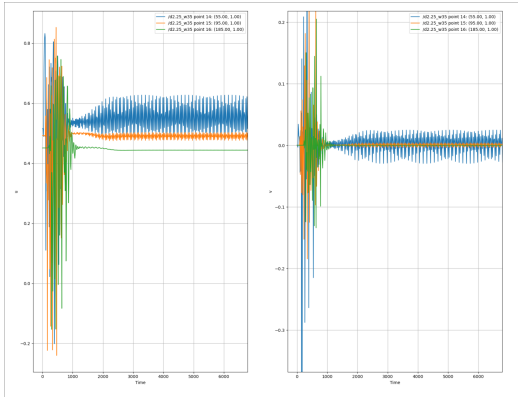
Results

We know there's always a convectively unstable TS mode, even in the blue curve. My hypothesis (taken with caution) for the region $\{d/\delta^* \leq 2.25\}$ is that if at some fixed d we get an absolute unstable mode localized in the downstream edge of the gap, then as we increase w , the wavelength associated to the absolute mode becomes convectively unstable.

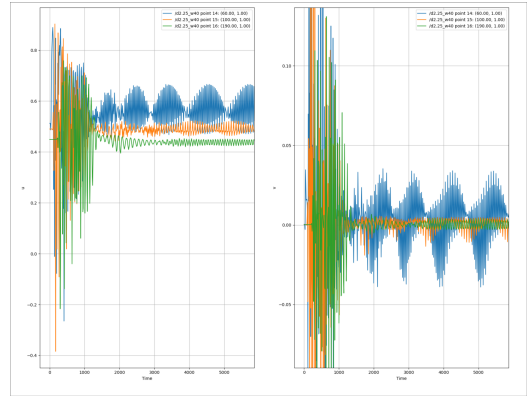


$$d = 2.25\delta^*$$

$$w = 35\delta^*$$

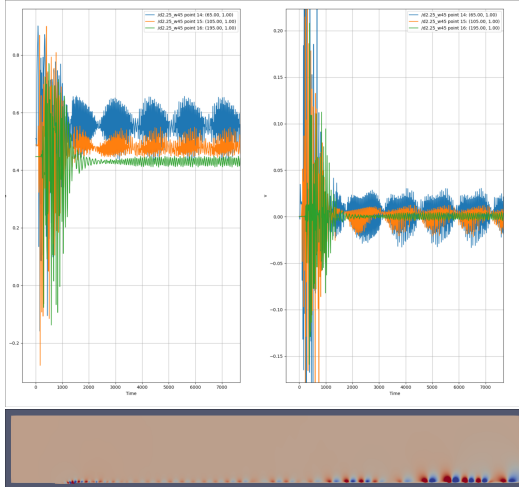


$$w = 40\delta^*$$

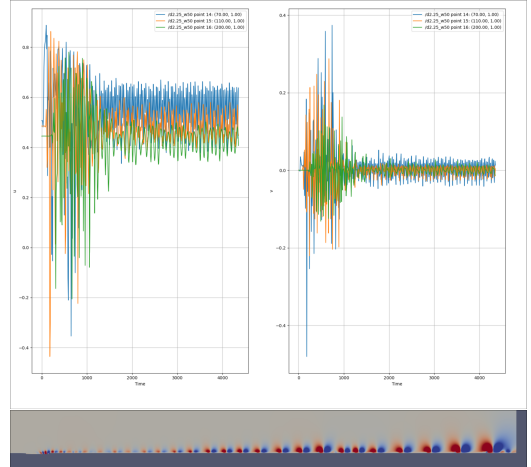


$$d = 2.25\delta^*$$

$$w = 45\delta^*$$

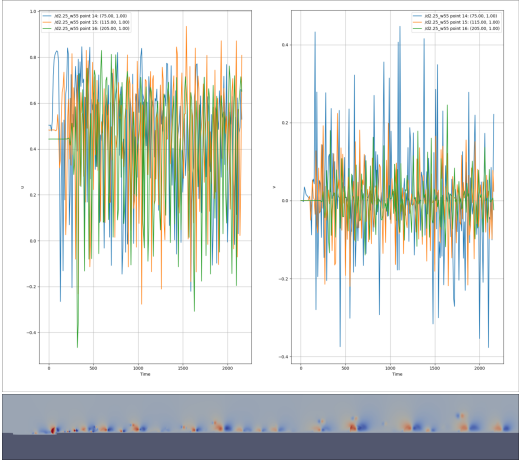


$$w = 50\delta^*$$



$d = 2.25\delta^*$

$w = 55\delta^*$



Absolutely unstable mode exciting TS waves

$$d = 2\delta^*, w = 40\delta^*$$

