IMPERIAL

Transient growth in flat plate

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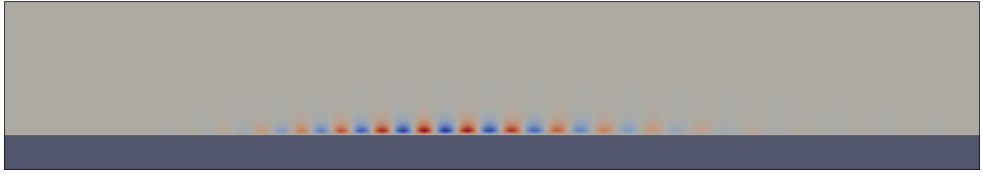
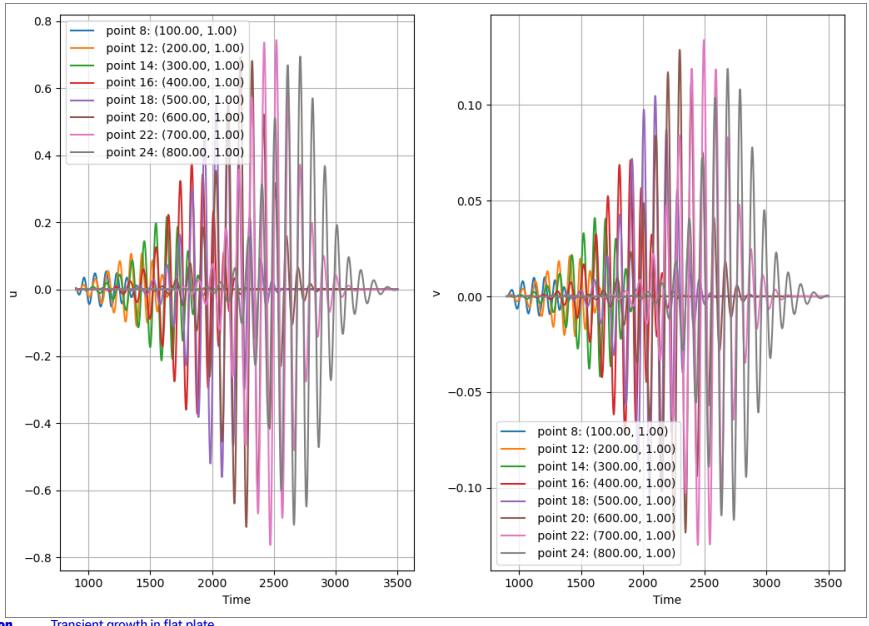
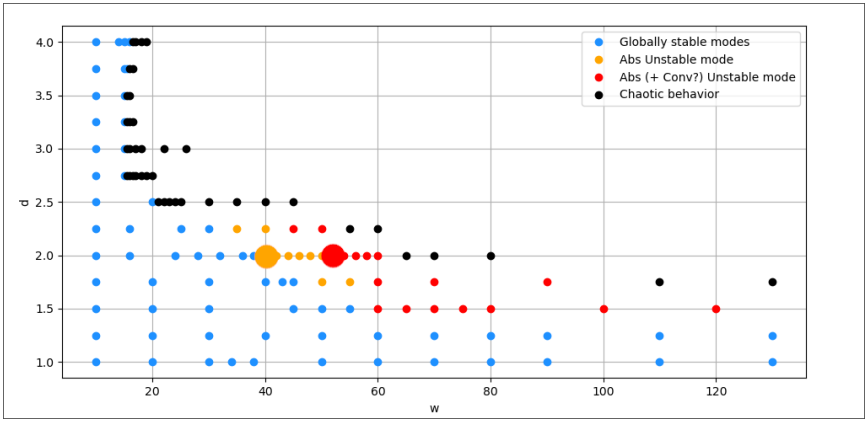
Transient growth in flat plate

- I tried transient growth in the flat plate.
- The length of the domain is $1000(\text{downstream}) - (-100\text{upstream}) = 1100$, as if it was a $0-$width gap domain. So I tried transient growth with $\tau = 450, 900$, τ being the time the simulation is evolved forwards and then backwards. It turned out that the phase speed of the TS modes is not 1 (of course, I didn't thought about that), it is much less (I estimated it to be around 0.35), so I get and amplification just until half of the domain more or less. Even though, **should I increase the length of the domain?**
- Now I am running the case for larger τ.




point 8: (100.00, 1.00)
point 12: (200.00, 1.00)
point 14: (300.00, 1.00)
point 16: (400.00, 1.00)
point 18: (500.00, 1.00)
point 20: (600.00, 1.00)
point 22: (700.00, 1.00)
point 24: (800.00, 1.00)
u
Time
v
Time

Harmonic analysis of the orange-to-red change



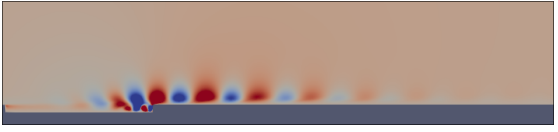
$d = 2, w = 40$

Freq with highest amplitude for u

ω : 0.00000000, **Amplitude** : 226.23665390
ω : 0.16174536, **Amplitude** : 0.33523849
ω : 0.23173134, **Amplitude** : 0.25998462
ω : 0.23328658, **Amplitude** : 5.02840019
ω : 0.23484183, **Amplitude** : 0.28651745

Freq with highest amplitude for v

ω : 0.00000000, **Amplitude** : 1.77348566
ω : 0.16174536, **Amplitude** : 0.40399285
ω : 0.23173134, **Amplitude** : 0.33448704
ω : 0.23328658, **Amplitude** : 6.55379325
ω : 0.23484183, **Amplitude** : 0.37806377



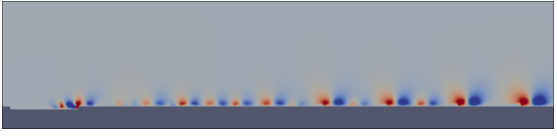
$d = 2, w = 52$

Freq with highest amplitude for u

ω : 0.00000000, **Amplitude** : 48.38968907
ω : 0.02559816, **Amplitude** : 3.03884201
ω : 0.06050475, **Amplitude** : 2.12776977
ω : 0.08610291, **Amplitude** : 2.39670993
ω : 0.08843002, **Amplitude** : 1.72555528

Freq with highest amplitude for v

ω : 0.02559816, **Amplitude** : 3.28989416
ω : 0.06050475, **Amplitude** : 1.56887596
ω : 0.08610291, **Amplitude** : 2.97408531
ω : 0.08843002, **Amplitude** : 2.26994456



Neutral curve blasius

- Inside the curve, convectively unstable; outside, convectively stable.