Review:

C.H] $\partial_t \epsilon + (\epsilon + p)\theta + \dots = 0$

R] $\dot{\theta} - \kappa\theta + \frac{1}{2}\theta^2 + \sigma_{AB}\sigma^{AB} = 0$

$\dot{\theta} + [p + \theta]\theta + \dots = 0$

θ: energy and volume

p: $-\kappa$ → EOS

κ: "surface gravity" or inaffinity

1) $\ell^a \nabla_a \ell^b = \kappa \ell^b$

2) $\pi_A = -n_a \nabla_A \ell^a$

3) $\theta = \frac{1}{2} \gamma^{AB} \frac{D}{dt} \gamma_{AB}$

4) $\sigma_{AB} = \frac{1}{2} \frac{D\gamma_{AB}}{dt} - \frac{1}{2}\theta\gamma_{AB}$

$$\omega_{AB} = \frac{1}{2}\frac{dA_{AB}}{dt} = \frac{1}{2}\omega_{AB}$$

Perturbations Ex.

$$\partial_t v + v\,\partial v = \left(\frac{\eta}{\rho}\right)\partial^2 v$$

1) $v = v_0 + v_1 + v_2 + \cdots$

$$\partial_t v_1 + v_0\,\partial v_1 = \left(\frac{\eta}{\rho}\right)\partial^2 v_1$$

$$\hookrightarrow \partial_0 v_1 = \left(\frac{\eta}{\rho}\right)\partial^2 v_1$$

$\Rightarrow$ decay !

2) gradient exp. $|\partial^2 v| << |\partial v|$

$$\left(\frac{v}{L^2} << \frac{v}{L}\right)$$

↳ $\partial_t v + v\,\partial v = 0$

Turbulent regime !

→ which approach is correct?

Turbulent regime?

$$\partial_t v + v\,\partial v = \left(\frac{\eta}{\rho}\right)\partial^2 v$$

when is $v\,\partial v \gg \left(\frac{\eta}{\rho}\right)\partial^2 v$?

↳ $\frac{v^2}{L} \gg \left(\frac{\eta}{\rho}\right)\frac{v}{L^2}$

↳ $\boxed{v L \frac{\rho}{\eta} \gg 1}$

$$Re \equiv \frac{v s \lambda}{\eta}$$

Reynolds number

A case for consideration

- Suppose post merger from some point ⇒ linear regime (M, a constants)

→ in particular flux of energy & ang momentum through $\mathcal{H}^+$

Qn: if $\Delta m \sim$ % of M.
$\Delta a \sim$ % of a

→ would you bet on linearity?

[Sberna, Bosch, Green, East, LL]

AiME: absorption, induced mode excitation

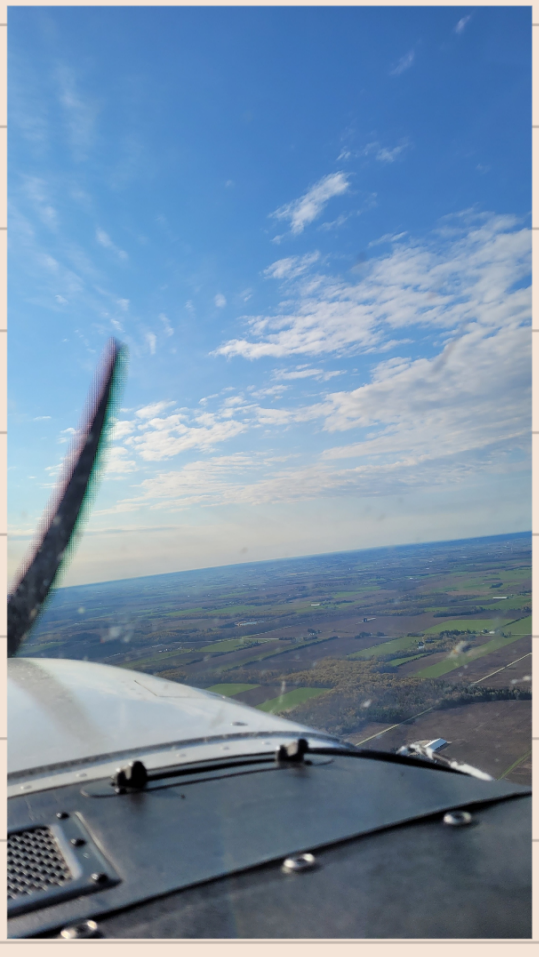
eg quadratic QNMs, etc...

L. Lehner (Argentina)

PhD Pittsburgh

→ Texas → UBC → Louisiana

PI ← PI/Guelph



× Making friends

× Run

× Test hydrod. & gravity