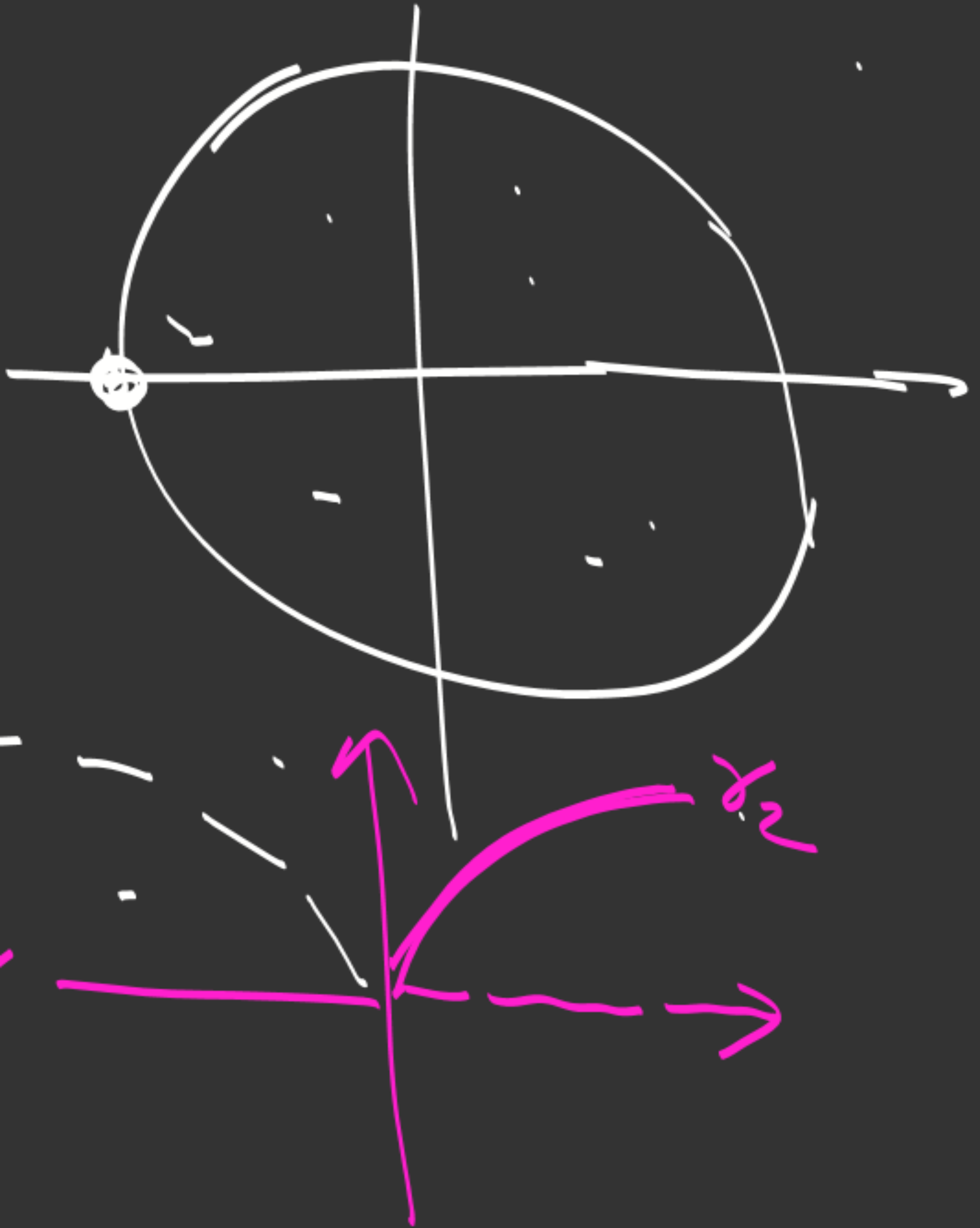
$$\dot{u} = F(u,p)$$

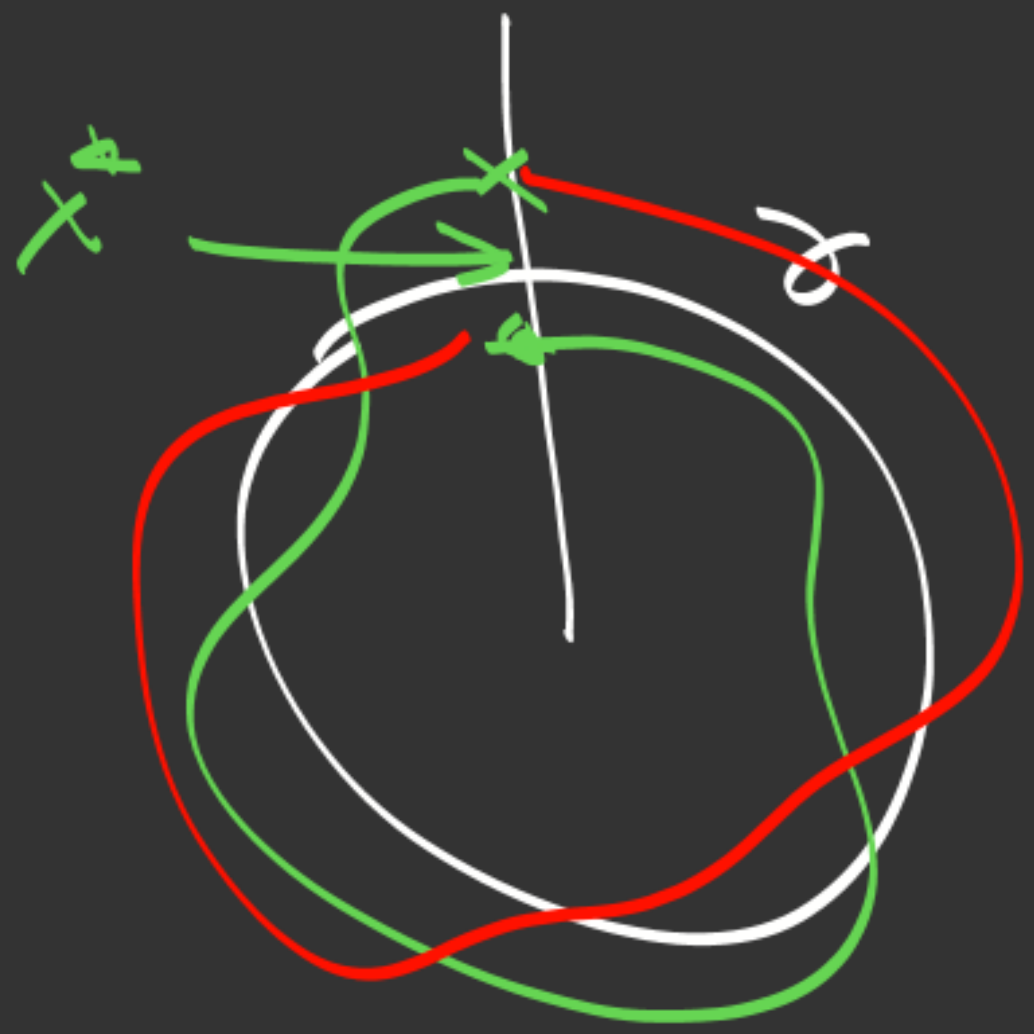
$$\dot{v} = Av + R(u,p) \simeq \underbrace{\overset{\text{tronqué}}{\boxed{Av + N(v,p)}} + \rho(v,\varphi)}_{\text{? persistance de la dynamique.}}$$

* Period doubling Π , $\underline{-1 \in \Sigma(d\Pi(x^*))}$

$\Pi : \mathbb{R}^{n-1} \to \mathbb{R}^{n-1}$ $\quad x_{n+1} = \Pi(x_n)$

$\dim(d\Pi(x^*) + 1) = 1 \rightsquigarrow \exists !$ variété invariante de dimension 1.





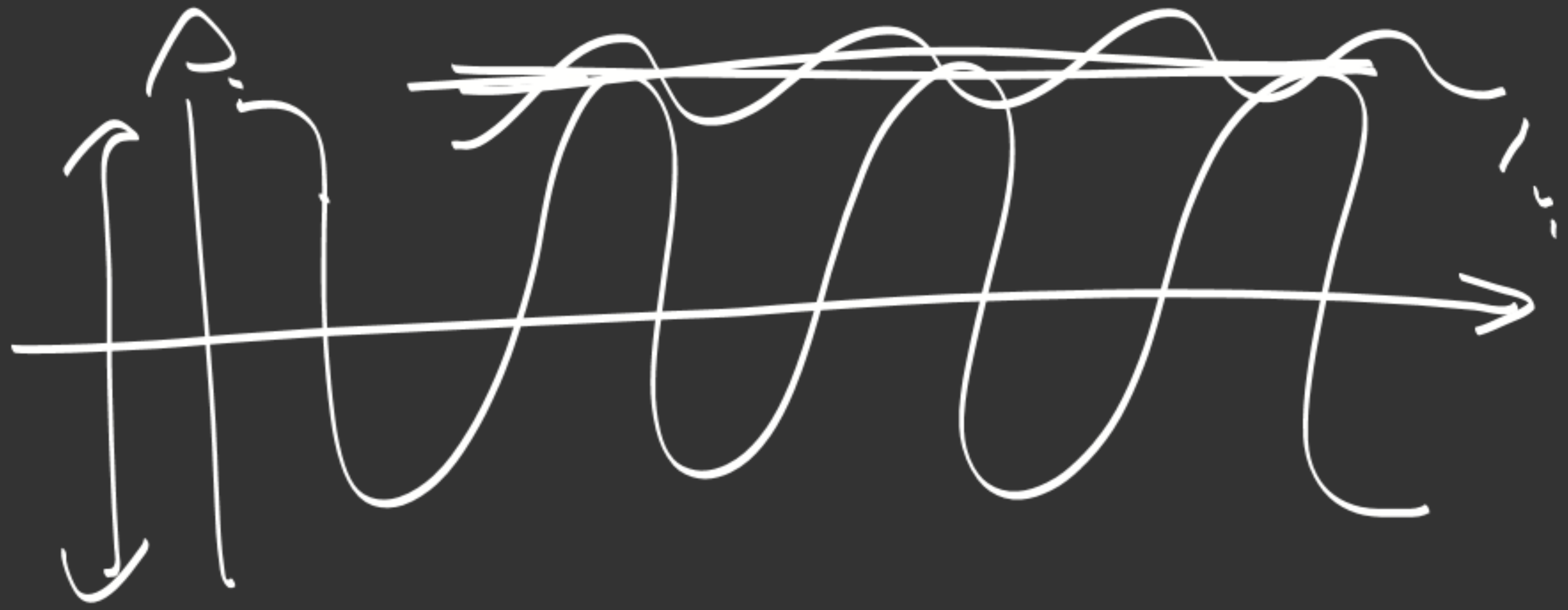
$z_{n+1} = \mathcal{N}(z_n) + \text{hot} \quad z_n \simeq x^*$

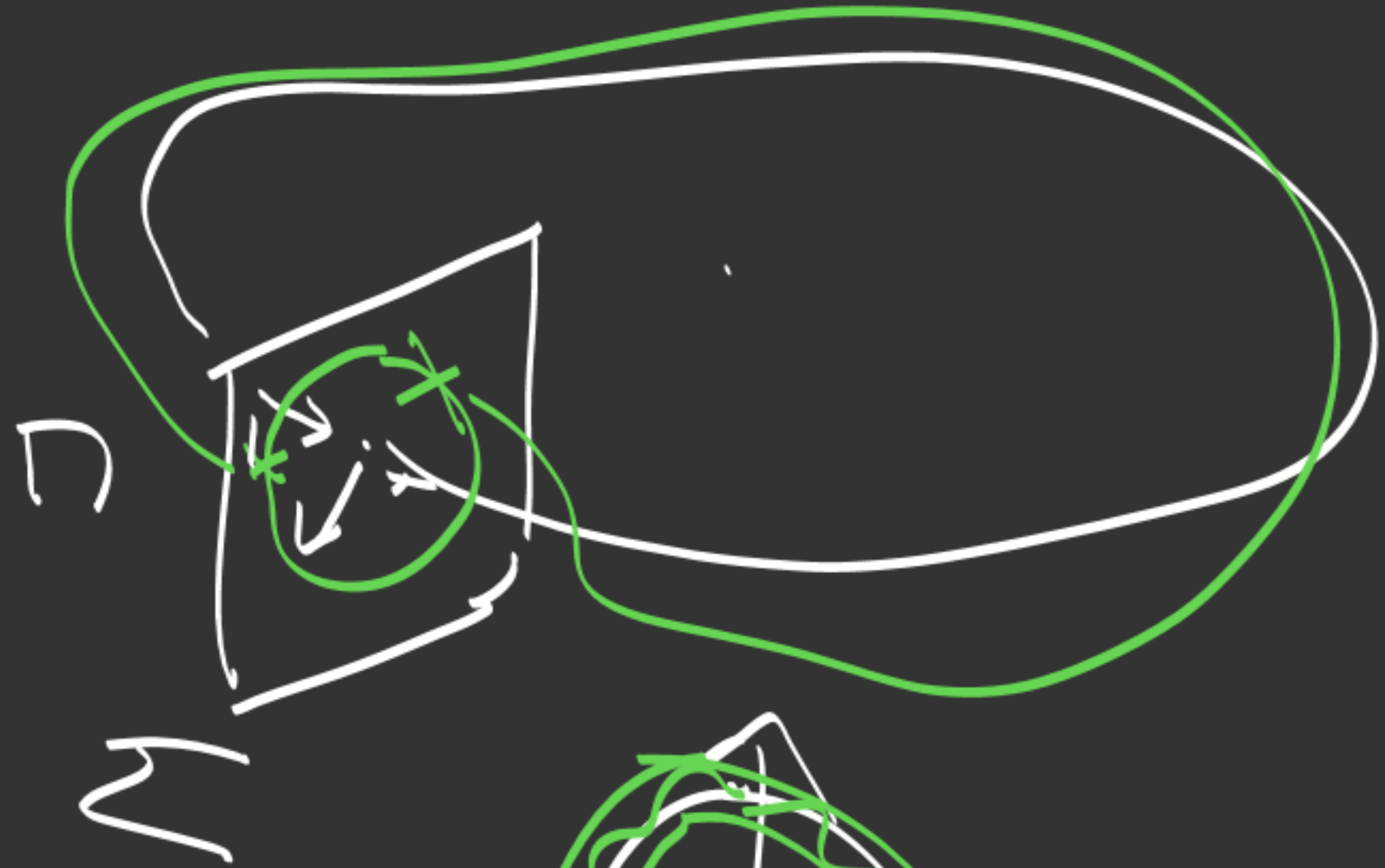
$= -(1+p) z_n + c z_n^3$

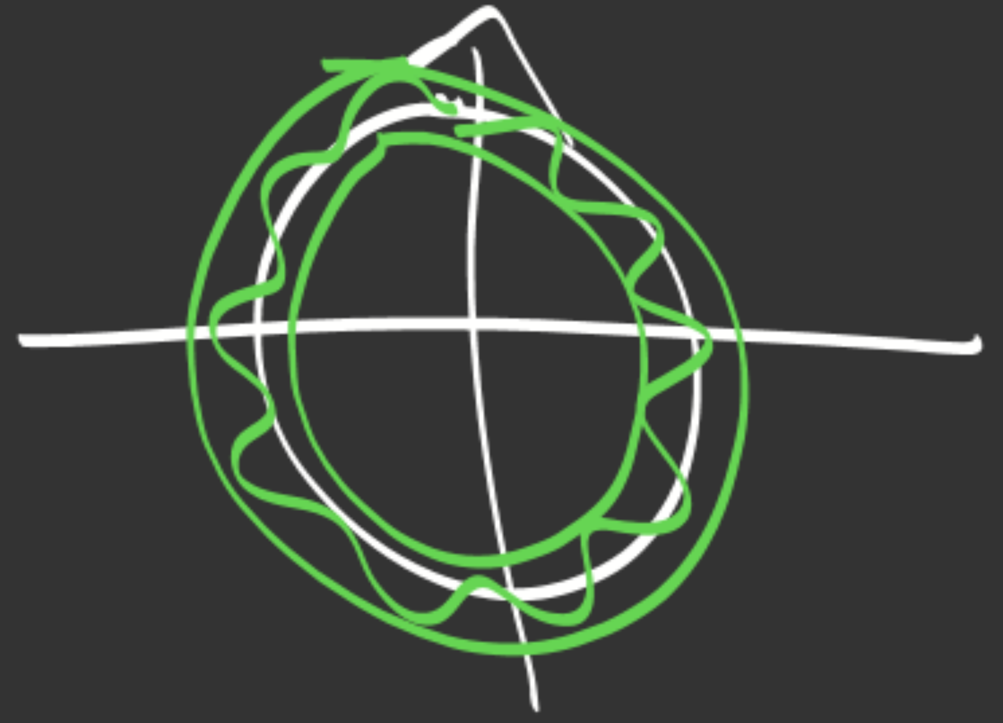
$= f(z_n)$

$z_{n+2} = f^2(z_n) \simeq (1+p)^2 z - U z_n^3$

$z^* = f^2(z^*)$







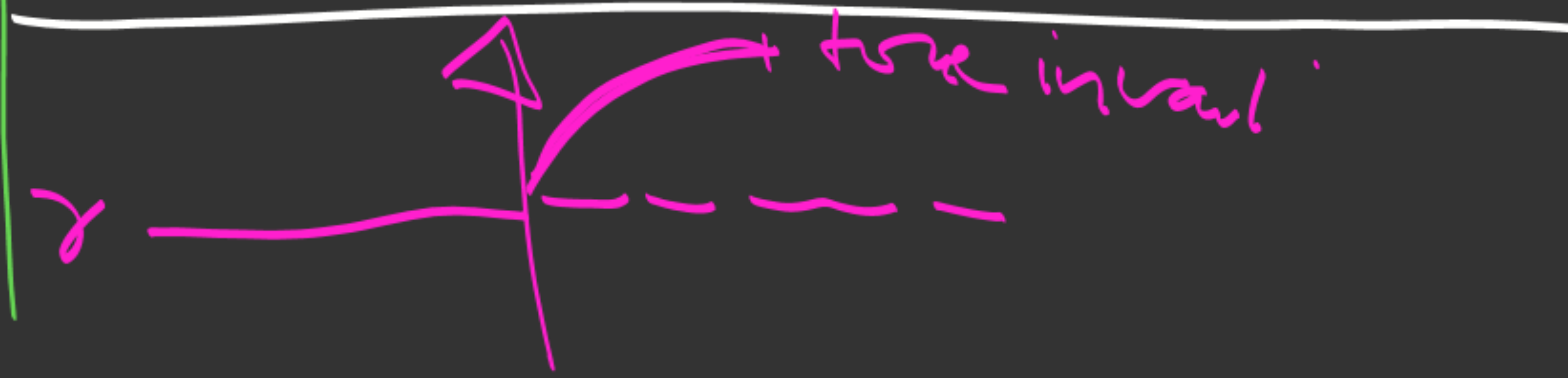
$$\lambda_0 \in \Sigma(d\,\Pi(x^*))$$

$$e^{i\theta} = \lambda_0^n \neq 1, \quad n = 1, 2, 3, \ldots$$

x_n est 2D. La FN

$$z_{n+1} = z_n e^{i\theta}(1 + p + d|z_n| \ldots$$

$$Z^{(1,2,3,4)}$$



Topics in Bifurcation theory, $\begin{cases} \text{Iooss} \\ \text{Adelmeyer} \end{cases}$

$\dot{u} = F(u, p)$

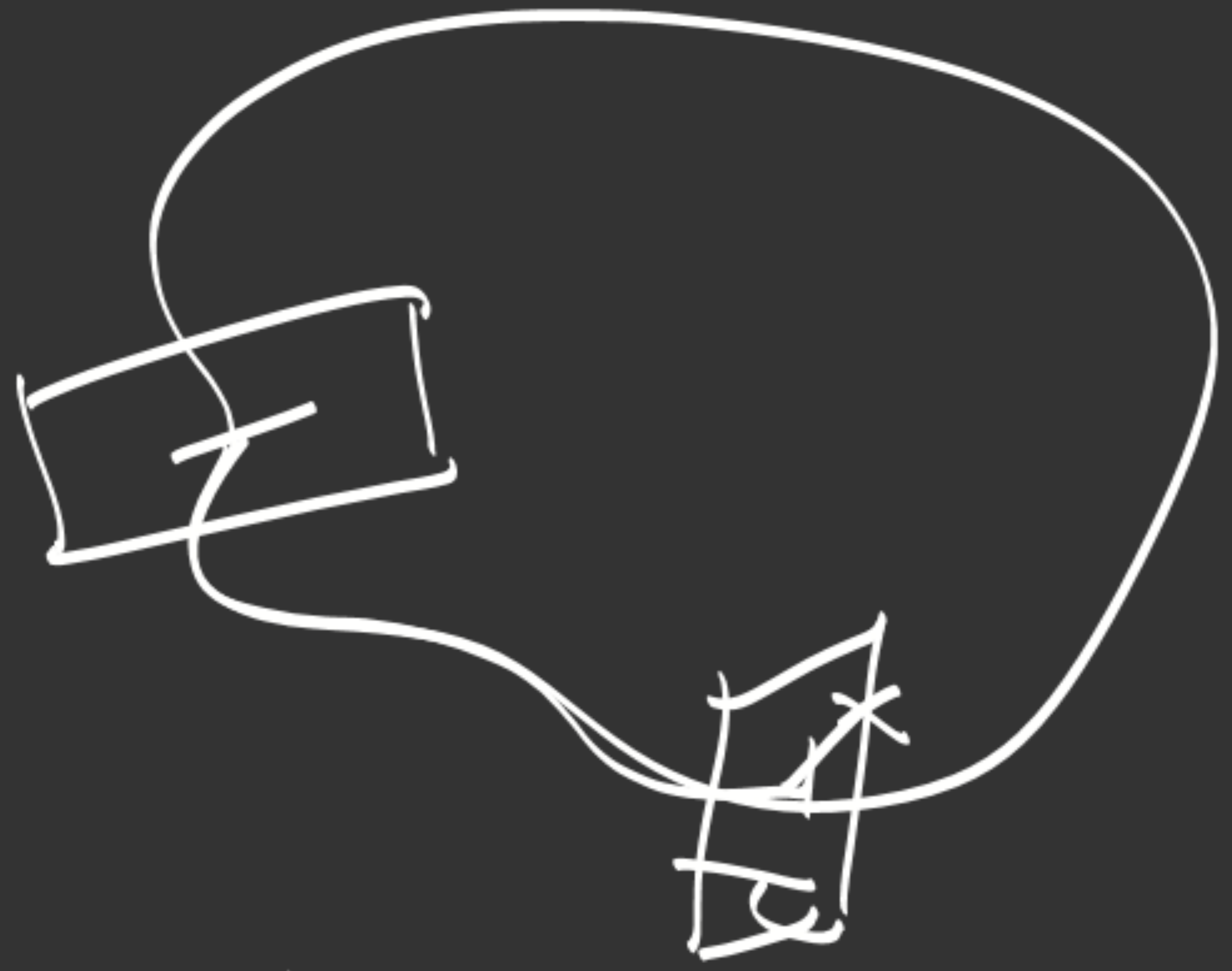
orbite γ, periode T

* Exposants de Floquets

Solution (ξ, σ) telle que

$$\begin{cases} \dot{\xi}(t) - dF(\gamma(t))\,\xi(t) = \sigma\,\xi(t) \\ \xi(0) = \xi(T) \end{cases}$$

Lien avec Π : $e^{\sigma T} \in \Sigma(d\Pi(x^*))$

γ 

σ_k / $\sigma_k \in i\mathbb{R}$, $\xi_k(t)$

$$x(t) = \gamma(\tau(t)) + Q_0(t)x + R(t)$$

$$Q_0(t)x \equiv \sum_{k=1}^{p} x_k \, \xi_k(t)$$

* $i\omega \notin i\mathbb{R}$

$$\begin{cases} \dfrac{i\omega T}{2\pi} = \dfrac{\alpha}{\beta} \\ \beta \geqslant 5 \end{cases}$$

$$z \equiv x_1 + i x_2$$

Forme normale

$$\begin{cases} \dfrac{d\tau}{dt} = 1 + \phi(|z|^2) \\ \dfrac{dz}{dt} = (i\omega + ap + b|z|^2)z + c_1 z^\beta + c_2 \bar{z}^\beta \end{cases}$$