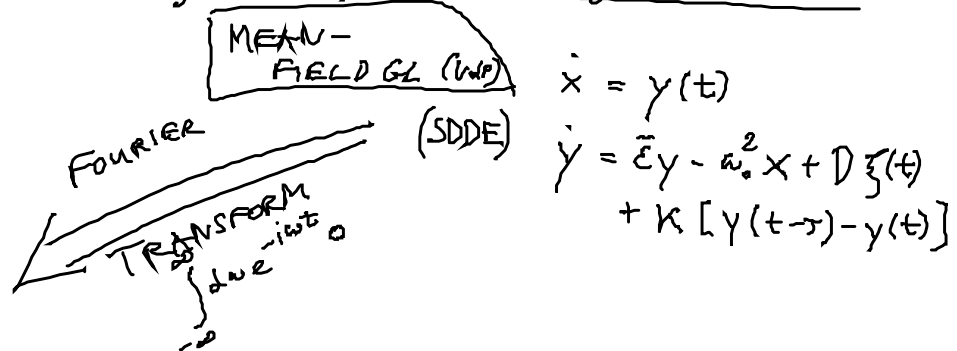


Kontrolle rauschinduzierter Oszillationen

im VdP-Modell

Analytische Näherung der spektralen Leistungsdichte $S(\omega)$



$$-i\omega \hat{x}(\omega) = \hat{y}(\omega) \quad \Leftrightarrow \quad \hat{x} = \frac{1}{\omega} \hat{y} \quad (1)$$

$$-i\omega \hat{y}(\omega) = \bar{\epsilon} \hat{y}(\omega) - \omega_0^2 \hat{x}(\omega) + D \hat{\zeta}(\omega) + k \hat{y}(\omega) (e^{i\omega\tau} - 1) \quad (2)$$

(1) → (2) | $i\omega$:

$$\hat{y} = \frac{i\omega D \hat{\zeta}(\omega)}{\omega^2 - \omega_0^2 - i\omega \bar{\epsilon} - i\omega k (e^{i\omega\tau} - 1)}$$

$$\langle \hat{y}(\omega) \hat{y}^*(\omega') \rangle = \frac{(i\omega D)(-i\omega' D) \langle \hat{\zeta}(\omega) \hat{\zeta}^*(\omega') \rangle}{[\omega^2 - \omega_0^2 - i\omega \bar{\epsilon} - i\omega k (e^{i\omega\tau} - 1)] [\omega'^2 - \omega_0^2 + i\omega' \bar{\epsilon} + i\omega' k (e^{-i\omega'\tau} - 1)]}$$

$$\begin{aligned}
 \langle \hat{\xi}(\omega) \hat{\xi}(\omega') \rangle &= \left(\frac{1}{2\pi} \right)^2 \int_{-\infty}^{\infty} dt e^{i\omega t} \int_{-\infty}^{\infty} dt' e^{-i\omega' t'} \langle \xi(t) \xi(t') \rangle \\
 &= \frac{1}{2\pi} \underbrace{\frac{1}{2\pi} \int_{-\infty}^{\infty} dt e^{i(\omega - \omega')t}}_{\delta(\omega - \omega')} \delta(t - t')
 \end{aligned}$$

$\omega = \omega'$

$$\longrightarrow \langle \hat{y}(\omega) \hat{y}^*(\omega') \rangle = \frac{D^2}{2\pi} \frac{\omega^2 \delta(\omega - \omega')}{(\omega^2 - \omega_0^2 + \omega k \sin \omega J)^2 + \omega^2 (\varepsilon - k(1 - \cos \omega J))^2}$$

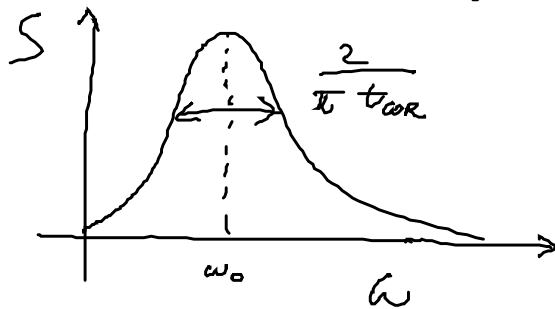
Wiener - Khinchine - Theorem

$$\begin{aligned}
 \langle \hat{y}(\omega) \hat{y}^*(\omega') \rangle &= \left(\frac{1}{2\pi} \right)^2 \int_{-\infty}^{\infty} dt e^{i\omega t} \int_{-\infty}^{\infty} dt' e^{-i\omega' t'} \langle y(t) y(t') \rangle \\
 &= \frac{1}{2\pi} \int_{-\infty}^{\infty} dt e^{i(\omega - \omega')t} \underbrace{\frac{1}{2\pi} \int_{-\infty}^{\infty} dt' e^{i\omega'(t-t')}}_{S(\omega')} \langle y(t) y(t') \rangle
 \end{aligned}$$

$t' = t + \tau$

$$\Rightarrow S_{yy}(\omega) = \frac{D^2}{2\pi} \frac{\omega^2}{(\omega^2 - \omega_0^2 + \omega k \sin \omega J)^2 + \omega^2 (\varepsilon - k(1 - \cos \omega J))^2}$$

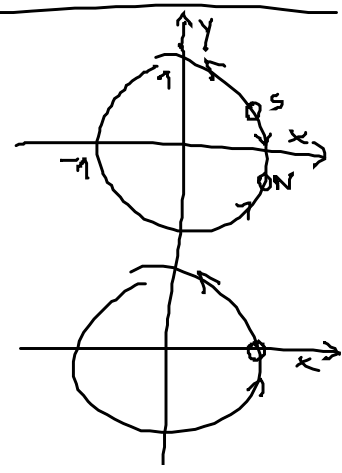
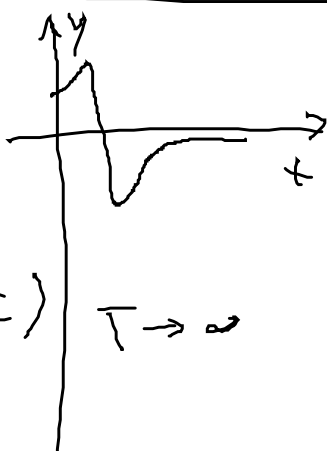
$$\boxed{k=0} \quad S(\omega) = \frac{D^2}{2\pi} \frac{\omega^2}{(\omega^2 - \omega_0^2)^2 + 4\zeta^2 \omega^2}$$



Generisches Modell für Anregbarkeit Typ I
 (SNIPER-BIF)
 (AUS 10)

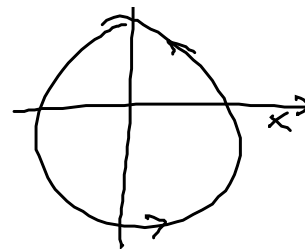
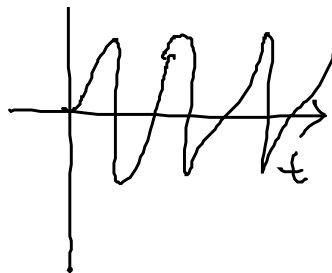
$$\begin{aligned} \dot{x} &= x(1-x^2-y^2) + y(x-b) + D \xi(t) + k[x(t-\tau) - x(t)] \\ \dot{y} &= y(1-x^2-y^2) - x(x-b) + D \xi(t) + k[y(t-\tau) - y(t)] \end{aligned}$$

$\boxed{k=D=0}$
 $b < 1$ (anregbar regime)

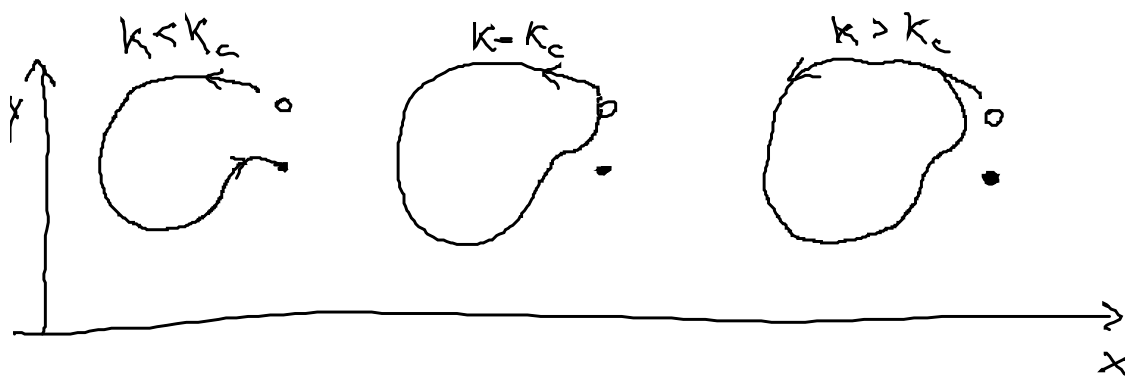
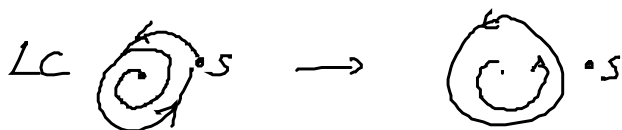


$b = 1$ (SN Bif on LC) $T \rightarrow \infty$

$b > 1$ (osc.)



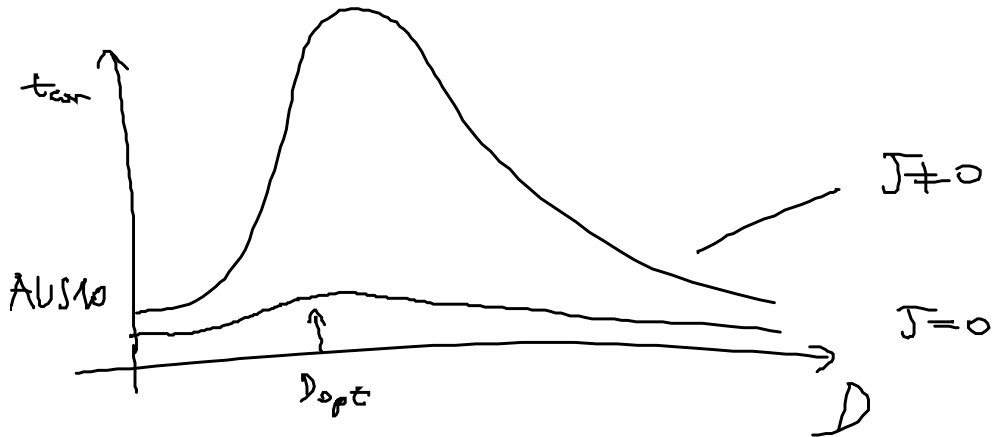
$|\overline{D}| = \infty$) Delay-induzierten globalen (homocl.) Bif. (H12 08)



$$T \sim \ln |k - k_c|$$



$D \neq 0$ Kontrolle rausch induzierter
 + rausch beeinflusster } Oszillationen
 ↑
 (delay-induzierte deterministische LC)



K