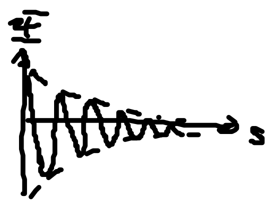
Autokorr. Fkt. für lin. stoch. Prozess



$$\Psi_{yy}(s) = \langle y(t)\, y(t+s)\rangle \approx \Psi_{yy}(0)\, e^{ps} \cos\tilde{\omega} s$$

wobei $\lambda_{1,2} = \underset{<0}{p} \pm i\tilde{\omega} = \frac{\tilde{\varepsilon}}{2} \pm i\sqrt{-\frac{\tilde{\varepsilon}^2}{4} + \omega_0}$

die Eigenwerte von $\underline{\underline{A}}$

$$\Rightarrow t_{cor} = \frac{1}{\Psi_{yy}(0)} \int_0^\infty |\Psi_{yy}(s)|\, ds \approx \frac{2}{\pi} \int_0^\infty e^{ps}\, ds = -\frac{2}{\pi p} = \frac{2}{\pi |p|}$$

Also $\boxed{t_{cor} = \frac{4}{\pi |\tilde{\varepsilon}|}}$ als Fkt. v. D (K=0)

<u>Mit Kontrolle (K≠0)</u>

$$\lambda^2 - \tilde{\varepsilon}\lambda + \omega_0^2 - K\lambda\left(e^{-\lambda\tau} - 1\right) = 0 \quad \text{char. Gl.}$$

$\tau \approx n\frac{2\pi}{\omega_0}$

$\Rightarrow$ unendl. viele Eigenwerte $\lambda_j^e = p_j^e + i q_j^e$

Die 2 Eigenwerte EW $\lambda_{1,2}^e = \delta_p \pm i(1+\delta_p)\omega_0$

mit betragsmäßig kleinstem $|\delta_p|$ sind von allen anderen EW separiert $\hat{=}$ $\tau \to 0$ (Ornstein-Uhlenbeck)

$\tau \approx n\frac{2\pi}{\omega_0} = nT_0$: $\boxed{t_{cor} = -\frac{2}{\pi\delta_p} \approx \frac{4}{\pi|\tilde{\varepsilon}|}\left(1 + \frac{K}{2}\tau\right)}$

Entw. für $|\delta_p| \ll 1$

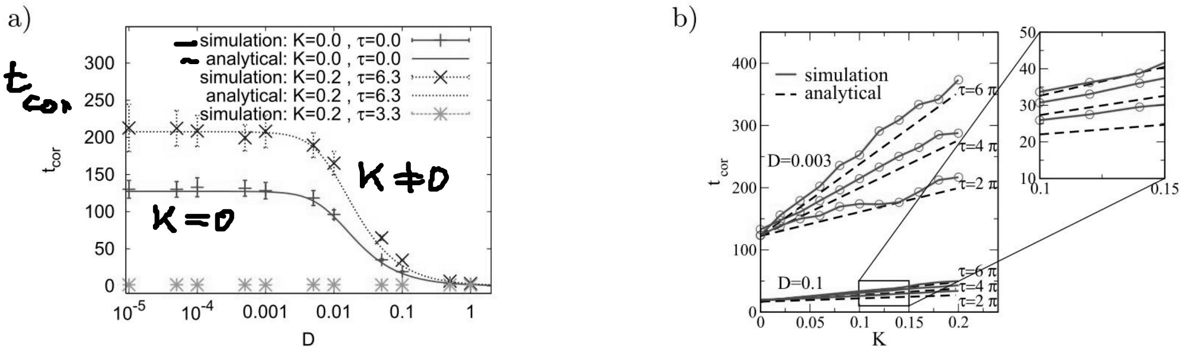


Fig. 2 – Correlation time t_{cor} in the VdP system for $\varepsilon = -0.01$ a) *vs.* noise intensity D for different values of τ and K (symbols: numerical solution; solid line: <u>analytical</u> mean-field estimate from eq. (12) for $K = 0$, and from eq. (18) for $K = 0.2, \tau = 6.3$); b) *vs.* feedback strength K for three different values of τ; analytical: from eq. (18).

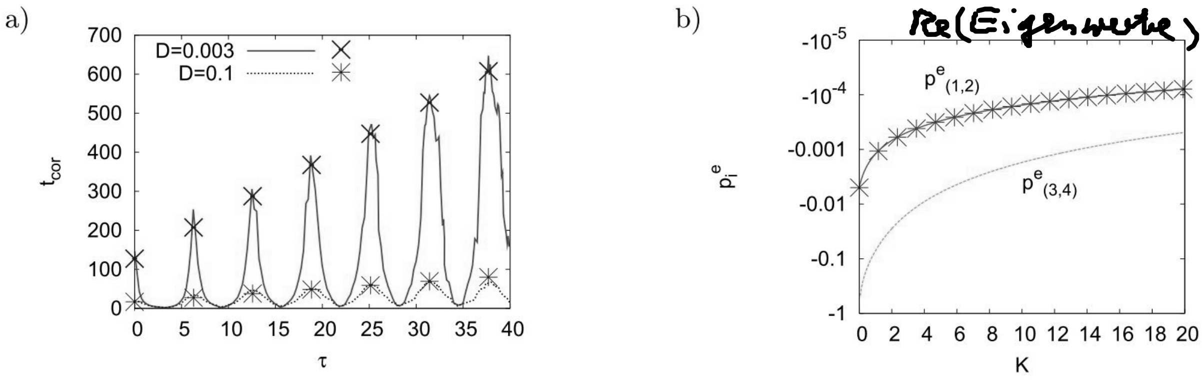


Fig. 3 – a) Correlation time t_{cor} in the VdP system *vs.* τ for $\varepsilon = -0.01$, $K = 0.2$. Solid line: numerical simulations; symbols: analytical estimate by (18). b) Largest real parts of characteristic equation in dependence on K for $\tilde{\varepsilon} = -0.01$, $\tau = 2\pi$. Solid lines: from numerical solution of characteristic equation (14); symbols: real part δ_p from linearized characteristic equation (17).