

2.1. Specific model.

$$(4) \quad \left[\frac{\partial}{\partial t} + \Delta + 1 \right] \left(-\frac{u(x, t)}{t} + u(x, t) + a(x, t) \right) = Bf u(x, t), \quad x \in \mathbb{R}^2, \quad t > 0,$$

$$(5) \quad \frac{a(x, t)}{t} = Au(x, t) - a(x, t), \quad x \in \mathbb{R}^2, \quad t > 0,$$

$x \in \mathbb{R}^2$.

$$(6) \quad \frac{u(x, t)}{t} = -u(x, t) + B \int_{\Omega} w(|x - y|) f u(y, t) dy - a(x, t), \quad x \in \Omega, \quad t > 0,$$

$\Omega \subset \mathbb{R}^2$.

$$(7) \quad w(r) = \int_0^\infty \frac{s J_0(rs)}{s^4 + s^2 + 1} ds,$$

J_0

$$(8) \quad F u_t + u + a = F w F B f u, \quad x \in \mathbb{R}^2, \quad t > 0,$$

F

$$(9) \quad F w = \frac{1}{s^4 + s^2 + 1}, \quad s \in \mathbb{R}.$$

$s \in \mathbb{R}$.

$$(10) \quad F w = \frac{1}{s^4 + s^2 + 1}, \quad s \in \mathbb{R}. \quad (4)$$

1.

$$(11) \quad f(u, \theta) = H(u - \theta) e^{-\rho/(u - \theta)^2}, \quad u, \theta \in \mathbb{R}, \quad \rho > 0, \quad f(u, \theta) = H(u - \theta).$$

(5)

$$(12) \quad f(u, \theta) = H(u - \theta) e^{-\rho/(u - \theta)^2}, \quad u, \theta \in \mathbb{R}, \quad \rho > 0, \quad f(u, \theta) = H(u - \theta).$$

H

$$(13) \quad H(u - \theta) = \begin{cases} 1 & \text{if } u > \theta \\ 0 & \text{if } u < \theta \end{cases}, \quad f(u, \theta) = H(u - \theta).$$

Ω

$$(14) \quad \frac{u}{r} \Big|_{r=R} = \frac{3u}{r^3} \Big|_{r=R} = 0.$$

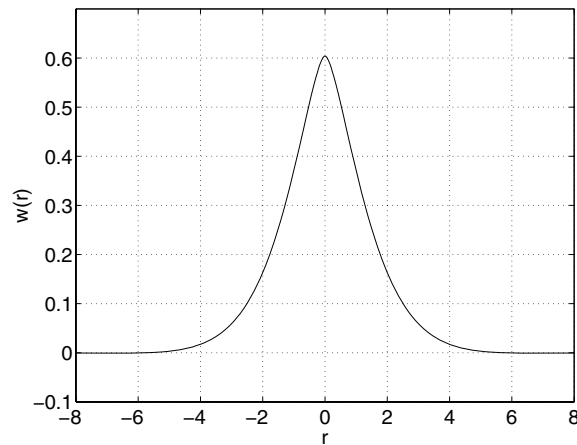


Figure 1. The coupling function $w(r)$, given by ().

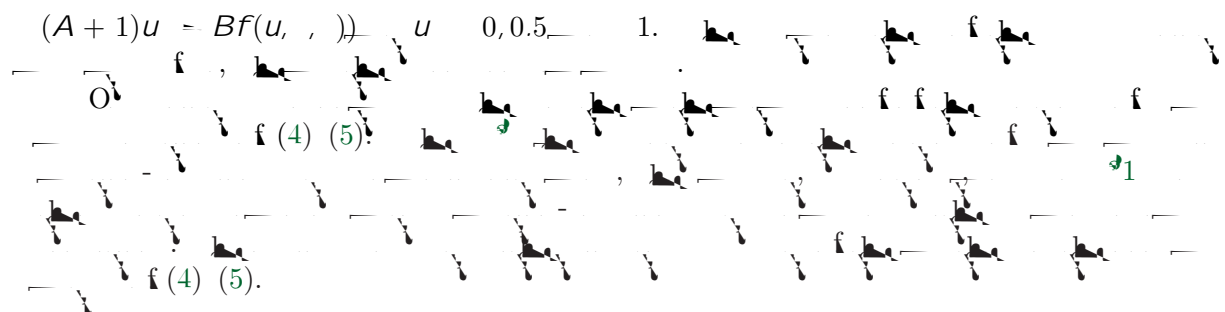
$$\frac{d^2 u}{dr^2} + \left[\frac{4}{r^2} - 2 + 1 \right] \left(-\frac{u}{r} + u + a \right) = Bf u, \quad (10)$$

$$-\frac{a}{r} = Au - a. \quad (11)$$

$$a = A \left(I - \frac{1}{r} \right)^{-1} u, \quad (12)$$

$$\left[\frac{4}{r^2} - 2 + 1 \right] \left[I - \frac{1}{r} + A \left(I - \frac{1}{r} \right)^{-1} \right] u = Bf u, \quad (13)$$

$f(1)$ (1) $(u,)$ $f(1)$ $f(4) (5)$
 $(4) (5)$ $(A = 2, B = 0.5, = 0.1, = 0.2),$



(4) **2.2. Stability.** (5)

$$\frac{u}{t} = -u + B^4$$

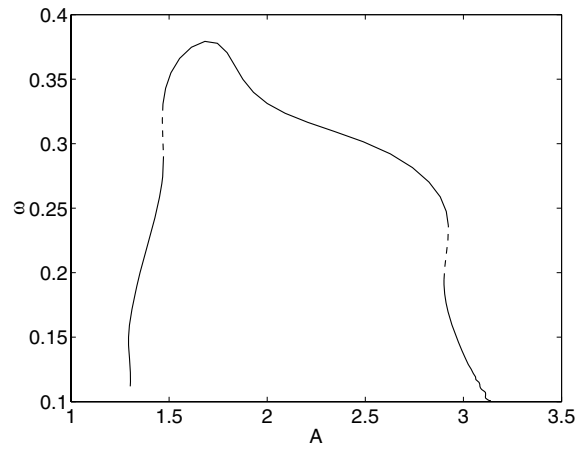


Figure 2. Rotational speed ω as a function of adaptation strength A . Solid lines indicate stable solutions, while dashed indicate unstable. See text for other parameters. Clicking on the above image displays the associated movie showing spirals at different points on the curve ($\Delta t = 0.01$, $\epsilon = 0.1$).

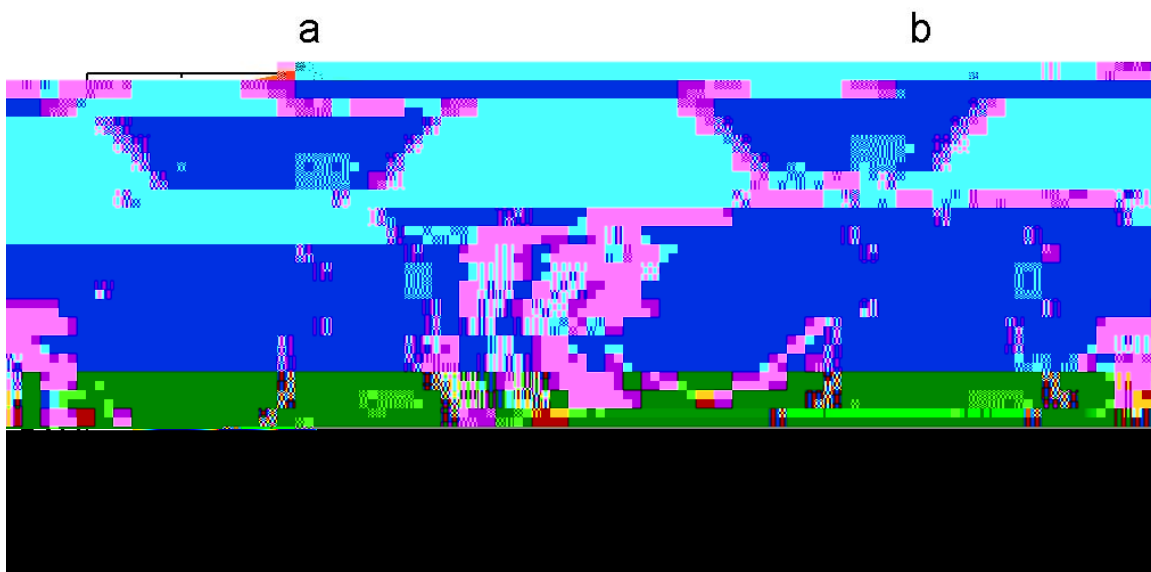
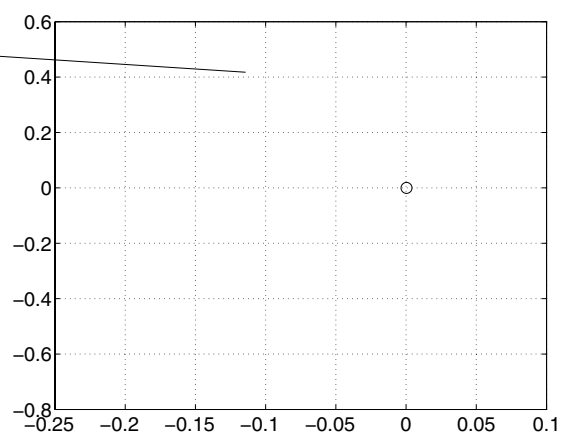
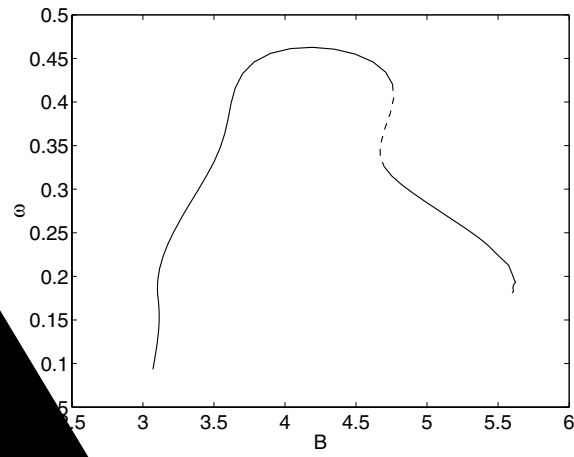
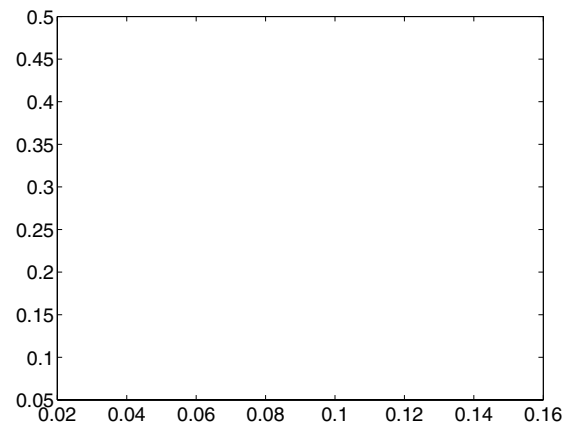


Figure 3.





function of B , the strength of the nonlinear term. Solid lines indicate stable, dashed lines indicate unstable. See text for other parameters. Clicking on the above image will allow you to view the bifurcation diagrams at different points on the curve (1) $\epsilon = 0.1$, (2) $\epsilon = 0.2$, (3) $\epsilon = 0.3$, (4) $\epsilon = 0.4$.



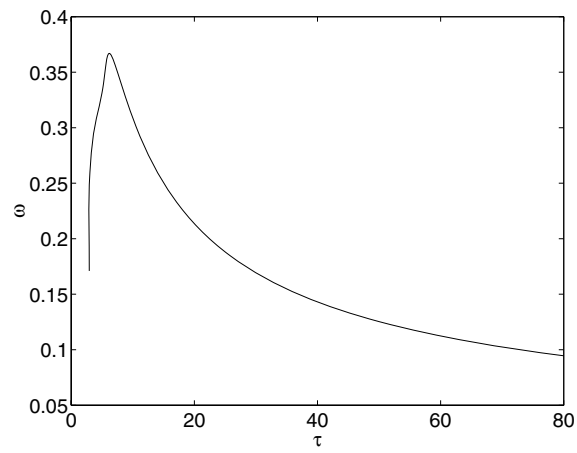
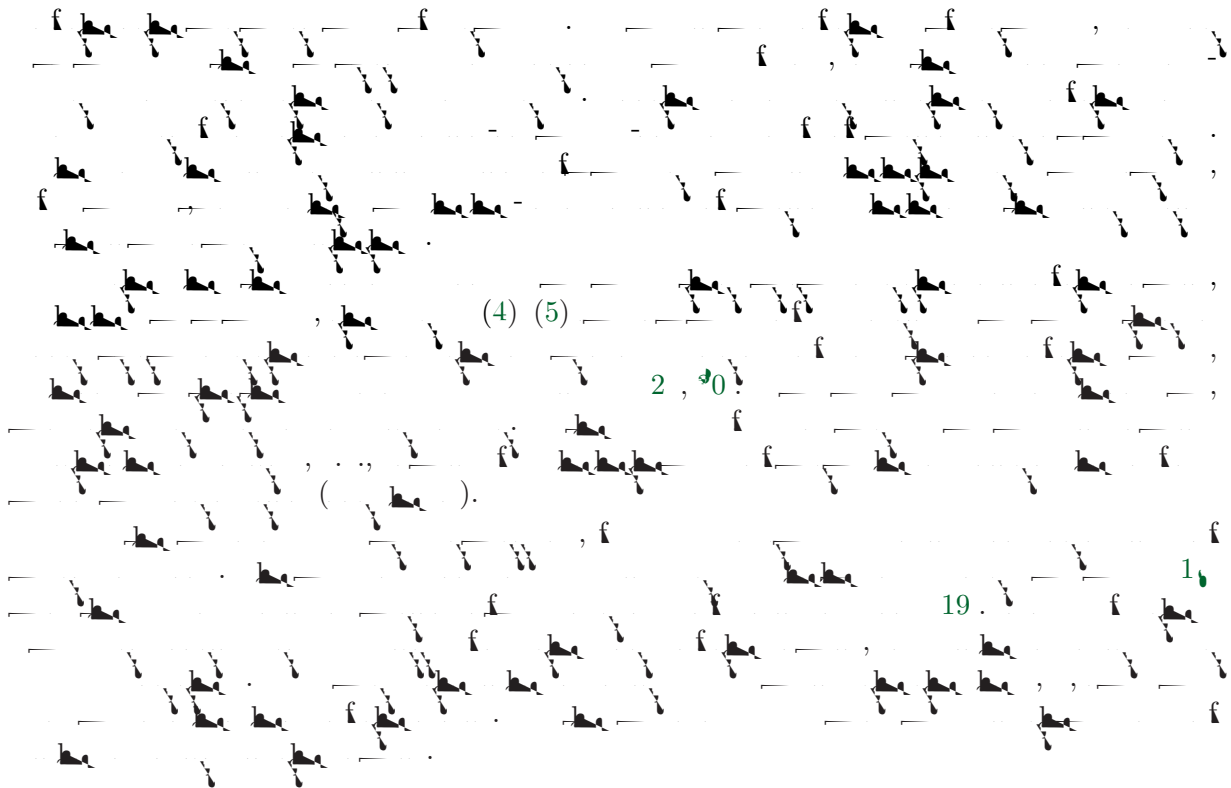
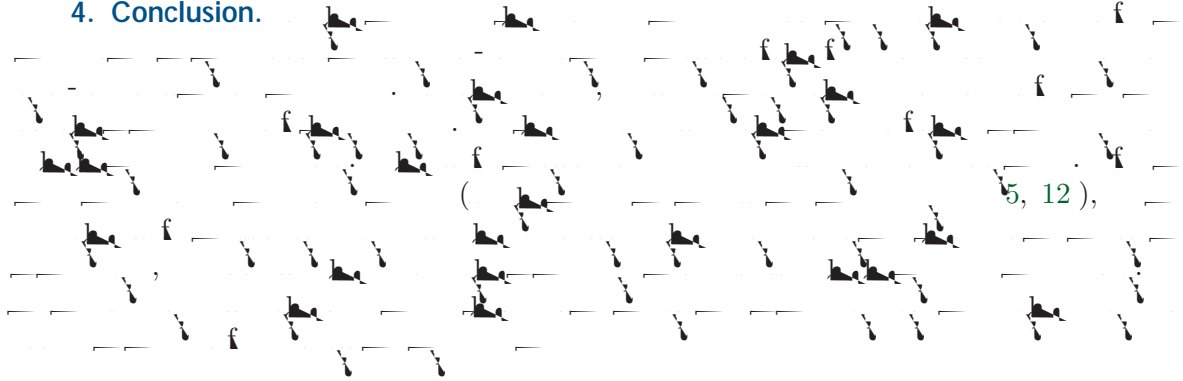


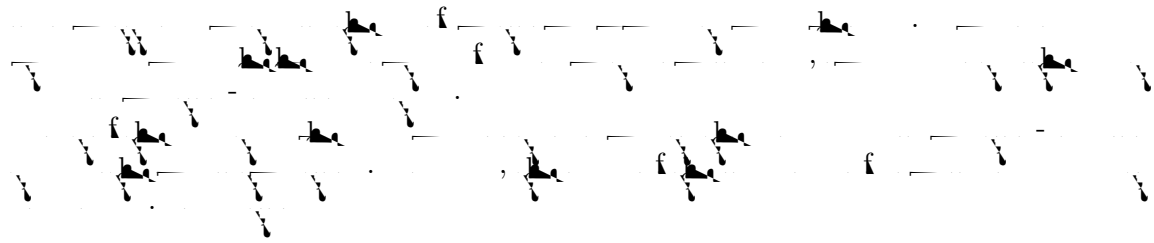
Figure 10. Rotational speed ω as a function of τ . See text for other parameters. Clicking on the above image displays the associated movie showing spirals at different points on the curve $(1 - \omega, \tau, \omega)$.





4. Conclusion.





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