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Pulse Bifurcations in Stochastic Neural Fields*

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Abstract. [illegible]

γ ... θ, ... $\gamma \to \infty$,

$$(\quad \theta) = \begin{cases} \;, & \geq \theta, \\ 0, & \theta, \end{cases}$$

... (.), ... (.) ... (.) ... ff ... fi ... ff ... (.)

$$\frac{(\;,\;)}{} = \frac{(\;,\;)}{} \quad \beta \frac{(\;,\;)}{} + \int_{-\pi}^{\pi} (\quad) \; '(\; (\;,\;)) \frac{(\;,\;)}{} \;,$$

... (.) ... (. .) ...

$$(\;.\;) \qquad (\;,\;) = \int_{-\pi}^{\pi} (\quad) \; '(\; (\;,\;)) \frac{(\;,\;)}{} + \alpha \; (\; (\;,\;)) \;,$$

...

$$(\;,\;) =$$

Figure 1. (A) ... pitch. ... SN ... = 0.5 ... SN ... (B) ... = 2 ... = 0.25

(.). (,) (0,), . fi λ 0, , (.). , λ_- β α β α. , λ_- fi , . , β, (( )). fi (.) (

$$\Delta(\quad + \zeta + \Psi(\, , \mu)),$$

Ψ , Ψ , Ψ … * … fi …

$$(\; . \;) \quad {}^* \quad \frac{(\;)}{(\;)} , = \quad (\;) + \alpha \; (\;) + \; '(\; (\;)) \int_{-\pi}^{\pi} (\quad) \; (\;) \quad \alpha \; (\;) \quad \alpha \; (\;)$$

… fi …

$$\zeta^*(\;) = \frac{'(\; (\;)) \; '(\;)}{' \; _f} \quad 0 \qquad \zeta^*(\;) =$$

$\delta \in \mathbb{R}$

$$(\; + \alpha) \; (\;) + \int_{-\pi}^{\pi} (\quad) \; '(\; (\;)) \; (\;) \quad = \frac{''(\;)}{\alpha}$$

$$\left\langle \frac{\Psi}{ }, \zeta^* \right\rangle_{\mathcal{X}} = \delta \left\langle \frac{\zeta}{ }, \zeta^* \right\rangle_{\mathcal{X}} \quad \frac{ }{\alpha} \left\langle \quad ''' \quad 0 \; , \zeta^* \right\rangle_{\mathcal{X}} \quad \frac{ }{ } \left\langle \quad , \zeta^* \right\rangle_{\mathcal{X}}$$

$$= \frac{\langle ''', \; ' \rangle_f}{\alpha \; \| \; ' \|_f},$$

$\langle ''', \; ' \rangle_f = \int_{-\pi}^{\pi} \; '(\; (\;)) \; '''(\;) \; '(\;) \; .$

$$(\; . \;) \qquad = \frac{\langle ''', \; ' \rangle_f}{\alpha \; \| \; ' \|_f}$$

fi $(\;) = (\;),$

$$(\; + \alpha) \; ''(\;) = \int_{-\pi}^{\pi} (\quad) \frac{(\; (\;))}{ }$$

$$\langle ''', \; ' \rangle_f = \int_{-\pi}^{\pi} \; '(\; (\;)) \; '''(\;) \; '(\;) \quad = \int_{-\pi}^{\pi} \frac{(\; (\;))}{ } \; '''(\;)$$

$$= \int_{-\pi}^{\pi} \frac{(\; (\;))}{ } \; ''(\;)$$

$$= \frac{ }{ \; + \alpha} \int_{-\pi}^{\pi} \int_{-\pi}^{\pi} (\quad) \frac{(\; (\;))}{ } \frac{(\; (\;))}{ } \qquad 0$$

, (. 0) α β, (. 0),

$$(\; . \;) \qquad = 0, \qquad \pm = \pm \sqrt{\alpha(\beta \quad \alpha) \frac{\| \; ' \|_f}{|\langle ''', \; ' \rangle_f|}}$$

(.), fi

$$\pm(\; , \;) = (\; + \; \pm) + \mathcal{O}(\mu),$$

$$\pm(\; , \;) = (\; + \; \pm) \quad \frac{\pm}{\alpha} \; '(\; + \; \pm) + \mathcal{O}(\mu)$$

[1] N (1.2), = , $\| \; ' \|_f^2 = |\langle \; ''' \quad ' \rangle|$ $\pm =$ $\pm\sqrt{\alpha(\; - \alpha)}$. A 3.1,

$\pm$,

$\pm(\ ,\ ) \approx (\xi), \quad \pm(\ ,\ ) \approx (\xi \pm \alpha), \quad \xi = + \pm$

ff fi

2.3. Perturbed amplitude equations at the drift bifurcation.

(. 0)

fi (.). $\mu = \beta \quad \alpha \quad 0$.

$\epsilon \quad (\ ,\ ) \quad \epsilon = \mu$, 0.

((. 0))

$(\ ) \sim \overline{\mu}\,(\mu\ ) \quad \mu \to 0,$ fi

$+$

(. 0), $\Delta(\ ) \sim \overline{\mu}$

ff

$= \overline{\mu} \quad] = \mu$

(.)

$$(\ .\ ) \qquad \overline{\mu}\ (\ ,\ ) = (\ ,\ ) \quad \beta\ (\ ,\ ) + \int_{-\pi}^{\pi} (\quad)\ (\ (\ ,\ )) ,$$

$$(\ .\ ) \qquad \overline{\mu}\ (\ ,\ ) = \alpha(\ (\ ,\ ) \quad (\ ,\ )) + \mu^{\frac{3}{2}}\ (\ ,]),$$

$(\ ,])= \overline{\mu} \quad (\ ,\mu^{-}\ ])$

μ.

$(\ (\ ,\ ))_{t\geq} \quad (\mu^{-\frac{1}{2}} \quad (\ ,\mu\ ))_{t\geq}$

(.)

$$(\ .\ ) \qquad (\ ,\ ) = (\quad \Delta(\ )) + \mu \quad (x \quad \Delta(\ ),\ ) + \mu^{\frac{3}{2}} \quad (\quad \Delta(\ ),\ ) + (\mu\ ),$$

$$(\ ,\ ) = (\quad \Delta(\ )) \quad \overline{\mu}$$

Δ (. 0),

Δ. , (.),

(( ) ∼ $\overline{\mu}$ (μ)) ff

( ) (β α) ( ) +

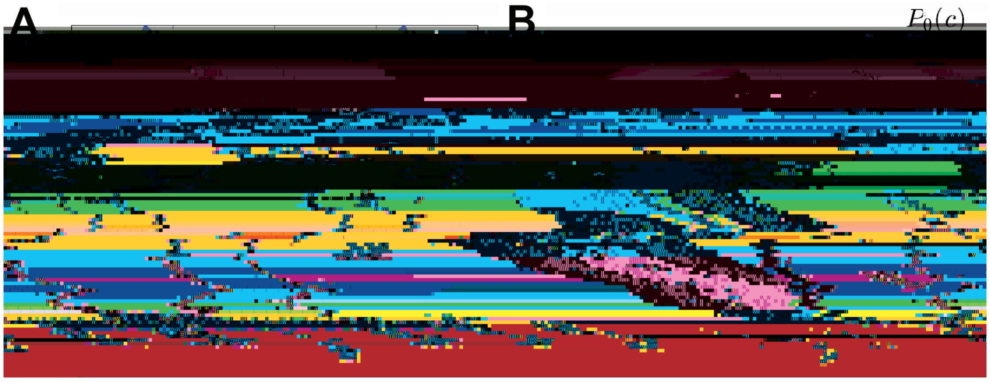

Figure 2. $_0($ $)$ ... c ... b ... c ... ffic ... (α) ... (1.7). ... c ... (1.2), ... (1.4), c ... c ... $\mathbf{C}($ $) =$ ( ). (A) C

$$(( )) = \int_{-\pi}^{\pi} ( ) \, '(\quad + \quad)$$

(.), (,). fi (.), fi θ ξ $= \pi$.

$(\pi) =$

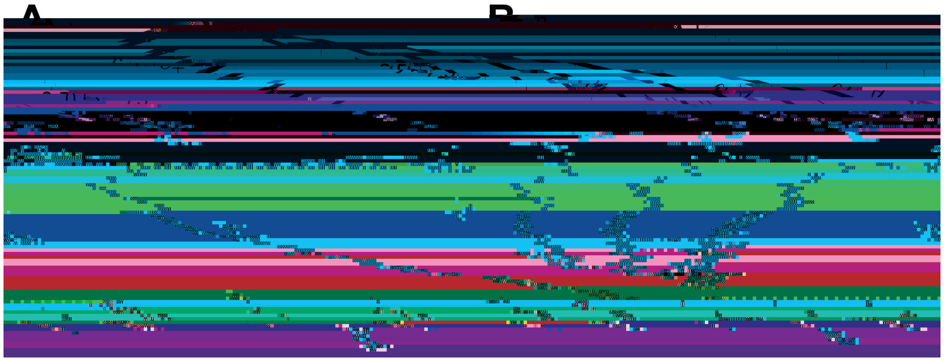

Figure 4. (A) [illegible] pitch. (B) [illegible] α.

[illegible]

(.) [illegible]

(.) [illegible]

[illegible]

(.) (

π ﬃ $\gamma_\pm$

ﬀ $(\ (\xi), q(\xi))$ (ξ),

$\gamma \quad + \gamma_-$

[7] D. Blömker, M. Hairer, and G. A. Pavliotis, [illegible], N[illegible], 20 (2007), [illegible]. 1721 1744.
[8] D. Blömker, S. Maier-Paape, and G. Schneider, [illegible], D[illegible] C[illegible]. Dy[illegible] S[illegible] S[illegible] B, 1 (2001), [illegible]. 527 541.
[9] M. Bode,

[33] C. W. Gardiner, [illegible] c, C[illegible], [illegible], 3

[59] M. Tsodyks, K. Pawelzik, and H. Markram, [illegible], N[illegible] C[illegible]., 10 (1998), [illegible]. 821 835.

[60] R. Veltz and O. Faugeras, [illegible], S[illegible] A[illegible]. A[illegible]. D[illegible]. S[illegible]., 9 (2010), [illegible]. 954 998.

[61] X.-J. Wang, [illegible], P[illegible]. R[illegible]., 90 (2010), [illegible]. 1195 268.

[62] H. R. Wilson and J. D. Cowan, [illegible], B[illegible]. C[illegible]., 13 (1973), [illegible]. 55 80.

[63] W. Xu, X. Huang, K. Takagaki, and J.-Y. Wu, [illegible], N[illegible], 55 (2007), [illegible]. 119 129.

[64] K. Yoon, M. A. Buice, C. Barry, R. Hayman, N. Burgess, and I. R. Fiete, [illegible], N[illegible]. N[illegible]., 16 (2013), [illegible]. 1077 1084.

[65] L. C. York and M. C. W. van Rossum, [illegible], [illegible]. C[illegible]. N[illegible]., 27 (2009), [illegible]. 607 620.