



Zachary P. Kilianicki and Baod Ewe

A musical score consisting of several staves of music. The notation includes notes, rests, and dynamic markings such as *ff* and *f*. There are several handwritten annotations in green ink: a '2' on the second staff, '14' on the third staff, '4, 10' on the fourth staff, and another '2' on the fifth staff. The score is arranged in a standard Western musical format with a treble clef on the left.

A musical score for a string quartet, consisting of four staves. The score is written in black ink on a white background. The notation includes various rhythmic values, accidentals, and dynamic markings such as *ff*. There are several green annotations: a green number '3' is placed above the second staff; a green number '44' is placed below the first staff; and a green sequence '1, 4, 12.' is placed above the third staff. The score is divided into measures by vertical bar lines.

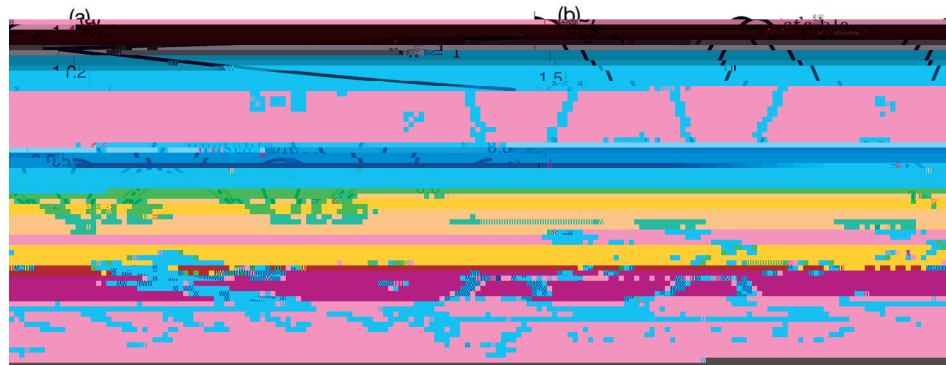
Musical score with annotations in green. The annotations include:

 - Numbers: 11, 30, 3, 11, 4, 12, 2, 2

 - Mathematical symbols: (1.), 0, -2

 - Symbols: k, 2

 - Dynamic markings: ff, fi



1. Input-locked bumps in the deterministic neural field (1.1) with input (2.3). (a) The bump half-width Δ for a unimodal ($\gamma = 1$) and bimodal ($\gamma = 2$) input calculated using (2.7) and

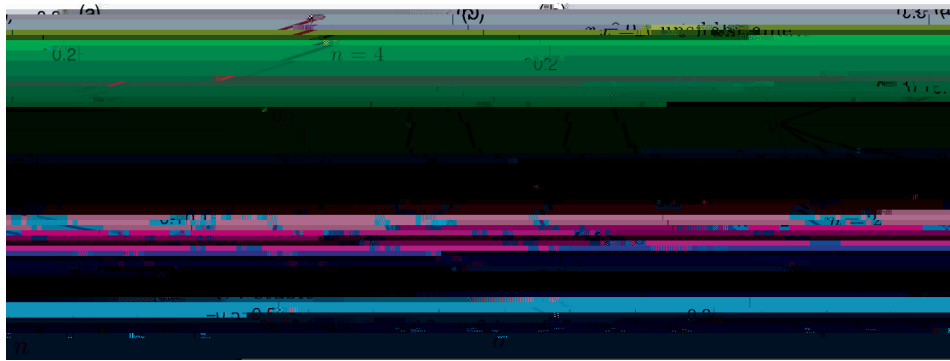
\dots , 10, 33, \dots (1.2). \dots

(2.10)
$$\dots / (\dots)$$

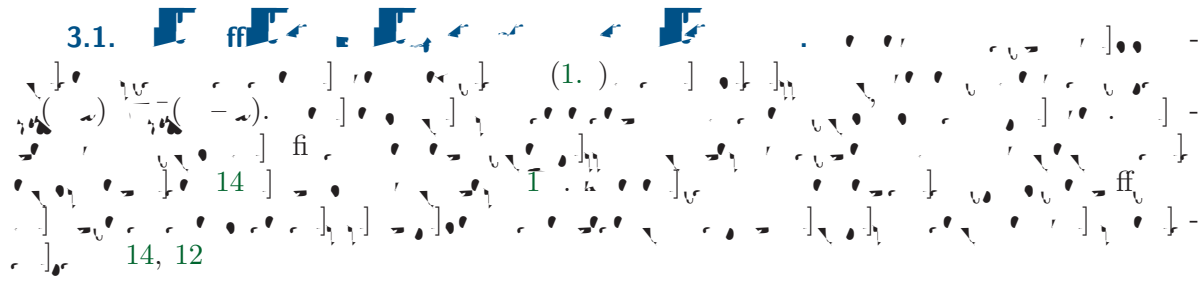
\dots (1.4). \dots (1.) \dots (2.10)

\dots





4. Eigenvalue λ_0

3.1. 

(3.1) $\Delta(\lambda) = \frac{1}{2} \frac{\int_{-\infty}^{\infty} f(x) \Delta(x) dx}{\int_{-\infty}^{\infty} f(x) \Delta'(x) dx}$

(3.2) $\Delta(\lambda)^2 = \frac{\int_{-\infty}^{\infty} f(x) \Delta(x) dx}{\left[\int_{-\infty}^{\infty} f(x) \Delta'(x) dx \right]^2}$

(3.3) $\Delta(\lambda) = \frac{\int_{-\infty}^{\infty} f(x) \Delta(x) dx}{\left[\int_{-\infty}^{\infty} f(x) \Delta'(x) dx \right]^2}$

(1.3

$\int_{\Omega} \text{div}(\mathbf{u}) \text{div}(\mathbf{v}) \text{d}\Omega = \int_{\Omega} \text{div}(\mathbf{u} \text{div}(\mathbf{v})) \text{d}\Omega - \int_{\Omega} \text{div}(\mathbf{v}) \text{div}(\mathbf{u}) \text{d}\Omega$

4. $\int_{\Omega} \text{div}(\mathbf{u}) \text{div}(\mathbf{v}) \text{d}\Omega = \int_{\Omega} \text{div}(\mathbf{u} \text{div}(\mathbf{v})) \text{d}\Omega - \int_{\Omega} \text{div}(\mathbf{v}) \text{div}(\mathbf{u}) \text{d}\Omega$

4.1. $\int_{\Omega} \text{div}(\mathbf{u}) \text{div}(\mathbf{v}) \text{d}\Omega = \int_{\Omega} \text{div}(\mathbf{u} \text{div}(\mathbf{v})) \text{d}\Omega - \int_{\Omega} \text{div}(\mathbf{v}) \text{div}(\mathbf{u}) \text{d}\Omega$

$$(4.1) \quad \int_{\Omega} \text{div}(\mathbf{u}) \text{div}(\mathbf{v}) \text{d}\Omega = \int_{\Omega} \text{div}(\mathbf{u} \text{div}(\mathbf{v})) \text{d}\Omega - \int_{\Omega} \text{div}(\mathbf{v}) \text{div}(\mathbf{u}) \text{d}\Omega$$

$$(4.2) \quad \int_{\Omega} \text{div}(\mathbf{u}) \text{div}(\mathbf{v}) \text{d}\Omega = \int_{\Omega} \text{div}(\mathbf{u} \text{div}(\mathbf{v})) \text{d}\Omega - \int_{\Omega} \text{div}(\mathbf{v}) \text{div}(\mathbf{u}) \text{d}\Omega$$

(4.2), (4.1), (4.1)




 . Bumps pinned by stationary inputs (2.3) in the stochastic neural field (1.7)

[ff''], $(-0]$ (),
 (3.20) ff'' (), *switch*
 (0); (0).
 3
 ff

4. $(1.)$, (1.2) (4.1) .
 ff'' ff'' () (4.3) .
 1.



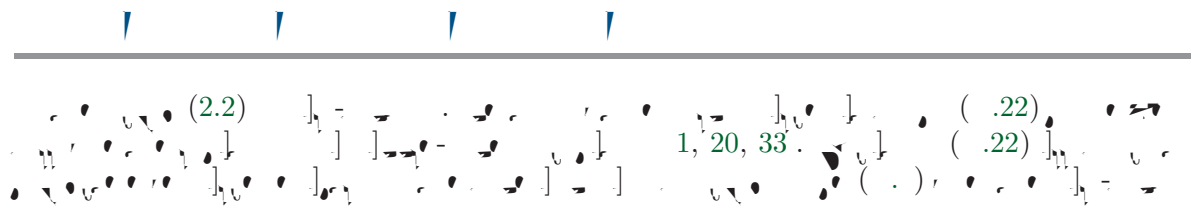
 . Pinning of bumps in the network (1.7) with synaptic weight (1.4) for low frequency synaptic heterogeneity. (a) Numerical simulation of (1.7) using synaptic weight (1.4) for $\beta = 2$, $\sigma = 0.1$, and $\varepsilon = 0.01$ shows that the bump remains pinned to the stable attractor at $x = 0$. (b) The variance of the bump's position plotted against time computed numerically (red dashed) across 1000 realizations saturates after a moderate amount of time when $\beta = 2$, as predicted by the Ornstein-Uhlenbeck approximation (3.20) (blue solid). (c) Numerical simulation for $\beta = 3$, $\sigma = 0.1$, and $\varepsilon = 0.01$ shows that the bump remains pinned to the stable location at $x = 0$. (d) The variance of the bump's position plotted against time computed numerically (r5.3(ti)-10.5F9(t)3.nwh



1 2 3 4 ()

...

(.14)
$$f(x) = \int_{-1}^x f'(t) dt$$



... ()] 2 - ... ()-1. ... ; 1 4 . ()01)-0 0 , 01. 1(22.)2 041. . . 0 [1 2

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- [5] R. Ben-Yishai, D. Hansel, and H. Sompolinsky, *Traveling waves and the processing of weakly tuned inputs in a cortical network module*, *J. Comput. Neurosci.*, 4 (1997), pp. 57–77.
 - [6] C. A. Brackley and M. S. Turner, *Random fluctuations of the firing rate function in a continuum neural field model*, *Phys. Rev. E*, 75 (2007), 041913.
 - [7] P. C. Bressloff, *Traveling fronts and wave propagation failure in an inhomogeneous neural network*, *Phys. D*, 155 (2001), pp. 83–100.
 - [8] P. C. Bressloff, *Stochastic neural field theory and the system-size expansion*, *SIAM J. Appl. Math.*, 70 (2009), pp. 1488–1521.
 - [9] P. C. Bressloff, *Spatiotemporal dynamics of continuum neural fields*

- [31] O. Faugeras, R. Veltz, and F. Grimbert, *Persistent neural states: Stationary localized activity patterns in the nonlinear continuous n -population, n -dimensional neural networks*, *Neural Comput.*, 21 (2009), pp. 147–187.
- [32] R. Festa and E. G. Dagliano, *Diffusion coefficient for a Brownian particle in a periodic field of force: I. Large friction limit*, *Phys. A*, 90 (1978), pp. 229–244.
- [33] S. E. Folias and P. C. Bressloff, *Breathing pulses in an excitatory neural network*, *SIAM J. Appl. Dyn. Syst.*, 3 (2004), pp. 378–407.
- [34] S. E. Folias and P. C. Bressloff, *Breathers in two-dimensional neural media*, *Phys. Rev. Lett.*, 95 (2005), 208107.
- [35] S. Funahashi, C. J. Bruce, and P. S. Goldman-Rakic, *Mnemonic coding of visual space in the monkey's dorsolateral prefrontal cortex*, *J. Neurophysiol.*, 61 (1989), pp. 331–349.
- [36] J. M. Fuster, *Unit activity in prefrontal cortex during delayed-response performance: Neuronal correlates of transient memory*, *J. Neurophysiol.*, 36 (1973), pp. 61–78.
- [37] C. W. Gardiner, *Handbook of Stochastic Methods for Physics, Chemistry, and the Natural Sciences*, 3rd ed., Springer-Verlag, Berlin, 2004.
- [38] P. S. Goldman-Rakic, *Cellular basis of working memory*, *Neuron*, 14 (1995), pp. 477–485.
- [39]

[57] J. B. Levitt, D. A. Lewis, T. Yoshioka, and J. S. Lund, *Topography of pyramidal neuron intrinsic*