

Traveling pulse solutions in a neural field model with asymmetric connectivity functions

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Abstract

In this talk I will analyse the activity of a one-dimensional neural field model developed by Amari [1]. His approach was to analyse a homogeneous neural field with a symmetric connection function of lateral inhibition type resulting in stationary pulse solutions. Here I will show that if the connection function is asymmetric, then the neural field may exhibit travelling pulse solutions. I will construct travelling pulse solutions for the case of a Heaviside step function for which I will derive the shape and velocity of the pulses. I will further determine the necessary conditions for the stability of the travelling pulses using Evans function techniques.

References

- [1] S. Amari. Dynamics of pattern formation in lateral inhibition type neural fields. *Biological Cybernetics*, 27:77–87, 1977.
- [2] S. Coombes and M. R. Owen. Evans functions for integral neural field equations with Heaviside firing rate function. *SIAM Journal on Applied Dynamical Systems*, 34:574–600, 2004.