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DYNAMICS OF NEURAL NETWORKS WITH DISCRETE AND DISTRIBUTED TIME DELAYS

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ABSTRACT

In this talk I will present a Hopfield-type neural network model, where one sub-system receives a delayed input from another sub-system [1]. The model includes a combination of both discrete and distributed delays, where distributed time delays represent the neural feedback between the two sub-systems, and discrete delays describe the neural interactions within each of the two sub-systems. Stability properties are investigated for different commonly used distribution kernels, and the results are compared to the corresponding results on stability analysis for networks with no distributed delays. I will show how boundaries of the stability region of the trivial equilibrium can be obtained analytically for the cases of delta, uniform and gamma distributions. Direct numerical simulations that confirm analytical findings will also be presented.

References

[1] B. Rahman, K.B. Blyuss & Y. N. Kyrychko *Dynamics of neural systems with discrete and distributed time delays*, SIAM Journal on Applied Dynamical Systems, 14 **(4)** , pp. 2069–2095 (2015).

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