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Concentration phenomena in a Fitzhug-Nagumo spatially extended neural network with noise

jeudi 18 novembre 2021 11:15 (30 minutes)

We consider the solution to a non-linear mean-field equation modeling a FitzHug-Nagumo neural network (see [1], [2], [3]). The non-linearity in this equation arises from the interaction between neurons. We suppose that the interactions depend on the spatial location of neurons and we focus on the behavior of the solution in the regime where short-range interactions are dominant. The solution then converges to a Dirac mass (see [4]). The aim of this talk is to characterize the blow-up profile: we will prove that it is Gaussian. Then we present interesting consequences of this result both at the macroscopic and the mesoscopic level.

[1] J. Baladron, D. Fasoli, O. Faugeras and J. Touboul. Mean-field description and propagation of chaos in networks of Hodgkin-Huxley and FitzHugh-Nagumo neurons The Journal of Mathematical Neuroscience, 2(10), 2012.
[2] M. Bossy, O. Faugeras and D. Talay. Clarification and complement to "mean-field description and propagation of chaos in networks of Hodgkin-Huxley and FitzHugh-Nagumo neurons", The Journal of Mathematical Neuroscience, 5(1), 2015.
[3] S. Mischler, C. Quininao and J. Touboul. ˜ —On a kinetic FitzHugh-Nagumo model of neuronal network, Comm. Math. Phys., 342(3):1001–1042, 2015.
[4] J. Crevat, G. Faye, F. Filbet —Rigorous derivation of the nonlocal reaction-diffusion FitzHugh-Nagumo system.

Orateur: BLAUSTEIN, Alain (Institut Mathématiques de Toulouse)