

# Multispecies models for large neural network description

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Today modeling large neural network is a topic more relevant than ever. In particular, the set up of computer simulations describing complex networks with a huge number of nodes is a formidable challenge. The intrinsic difficulties concerning the prohibitive computational costs may be handled to some extent by exploiting what we call “multispecies” models.

From a mathematical perspective this issue consists in formalizing the PDE-based continuum models which describe the high-density populations inside the network and studying interactions between them and the ODE-based discrete models for each neuron belonging to the low-density populations. In particular, we exploit such an approach to describe the Golgi-Granular cell loop network in the Cerebellum. Each single cell is described by means of the FitzHugh-Nagumo model and both electrical and chemical (excitatory and inhibitory) synapses are taken into account. Several simulations describing interesting phenomena as synchronization and travelling waves have been done. Biological aspects have also been examined in order to provide our work with scientific completeness.

## Références

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