

The implementation of growth guidance factor diffusion via octree spatial structures for neuronal systems simulation

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© Springer International Publishing AG 2018. The BioDynaMo project was created in CERN OpenLab V and aims to become a general platform for computer simulations for biological research. Important development stage was the code modernization by changing the architecture in a way to utilize multiple levels of parallelism offered by today's hardware. Individual neurons are implemented as spherical (for the soma) and cylindrical (for neurites) elements that have appropriate mechanical properties. The extracellular space is discretized, and allows for the diffusion of extracellular signaling molecules, as well as the physical interactions of the many developing neurons. This paper describes methods of the real-time growing brain dynamics simulation for BioDynaMo project, a specially the implementation of growth guidance factor diffusion via octree spatial structures.

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Keywords

Biodynamo, Diffusion, Growth guidance factor, Neuronal systems simulation, Octree, Octree spatial structures

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