Learning locomotion control system for 3D model of C. Elegans nematode

Demin[1)] A. V., Palyanov[2)] A. Yu.

[1)] A.P. Ershov Institute of informatics systems SB RAS, alexandredemin@yandex.ru
[2)] A.P. Ershov Institute of informatics systems SB RAS, palyanov@iis.nsk.su

Abstract. In this paper we propose a learning model of neural circuit controlling locomotion of C. elegans nematode. Using realistic 3D simulator of the nematode, a number of successful computational experiments on proposed model's learning were performed. It was shown that the control system was stably trained to produce effective undulatory way of forward movement within 100 cycles at average. At the same time significant visual similarity was observed between the way of movement found by a model and used by real biological nematode. Obtained results indicate that neural circuit controlling locomotion is able to learn complex undulatory form of nematode locomotion based only on experience of system's interaction with environment, and that proposed model of control system is quite effective and can be used for driving complex objects possessing multiple degrees of freedom.