Simulation and Measurement of the Electric Fields Generated by Weakly Electric Fish

Authors: Brian Rasnow, Christopher Assad, Mark Nelson, James Bower

Abstract: The weakly electric fish, Gnathonemus peters;;, explores its environment by gener(cid:173) ating pulsed elecbic fields and detecting small pertwbations in the fields resulting from nearby objects. Accordingly, the fISh detects and discriminates objects on the basis of a sequence of elecbic "images" whose temporal and spatial properties depend on the tim(cid:173) ing of the fish's electric organ discharge and its body position relative to objects in its en(cid:173) vironmenl We are interested in investigating how these fish utilize timing and body-po(cid:173) sition during exploration to aid in object discrimination. We have developed a fmite-ele(cid:173) ment simulation of the fish's self-generated electric fields so as to reconstruct the elec(cid:173) trosensory consequences of body position and electric organ discharge timing in the fish. This paper describes this finite-element simulation system and presents preliminary elec(cid:173) tric field measurements which are being used to tune the simulation.