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A Simulation of a Convective flow to give a Key of defining the Shape of the Human Brain[1] SATOKO KOMURASAKI, Nihon University, KUNIO KUWAHARA, Institute of Computational Fluid Dynamics — Since the principal rules for a self-organizing neural network are not sufficient for determining the shape and anatomical features of the brain, these must be governed by other rules. Ontogeny of the global shape of the brain is guided by radial glial fibers. The rules defining the growth pattern of radial glial fibers, therefore, should be the rules for a self- organization for the shape of the brain. In the vortex theory of the human brain (T. Nakada, 2003), it is shown that radial glial fibers grow along a pattern of a flow similar to thermal convection. That is, a convective flow determines the overall shape and structural anatomical detail of the human brain. In this paper, to establish the vortex theory of the human brain, a simulation of a convective flow is carried out. In the computation, the incompressible Navier-Stokes equations based on Boussinesq approximation are solved by multi-directional finite difference method. The computational domain of sphere shape is employed. The computed flow is visualized suitably, and investigated qualitatively.

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