Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Flow pattern in the ventricle of brain with cilia beating and CSF circulation YONG WANG, CHRISTIAN WESTENDORF, Max Planck Institute for Dynamics and Self-Organization, REGINA FAUBEL , GREGOR EICHELE , Max Planck Institute for Biophysical Chemistry, EBERHARD BODENSCHATZ, Max Planck Institute for Dynamics and Self-Organization — We recently discovered that cilia of the ventral third ventricle (v3V) of mammalian brain generate a complex flow network close to the wall. However, the flow pattern in the overall three dimensional v3V, especially under physiological condition, remains to be investigated. Computational fluid dynamics is arguably the best approach for such investigations. Several v3V geometries are reconstructed from different data for comparison study. The lattice Boltzmann method and immersed boundary method are used to reproduce the experimental set-up for an opened v3V firstly. The experimentally recorded cilia induced flow network is projected on the curved v3V wall. The flow maps obtained numerically at different heights from the v3V wall agree with the experimental data qualitatively. We then consider the entire v3V with ciliary flow network along the wall for boundary condition. Moreover, we add a time dependent flow rate to represent the CSF circulation, and study flow pattern in the ventricle. We thank the Max Planck Society (MPG) for financial support. This work is conducted within the Physics and Medicine Initiative at Goettingen Campus between MPG and University Medical Center.

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Date submitted: 11 Nov 2016 Electronic form version 1.4