

3-D Finite Element Modeling of Brain Edema: Initial Studies on Intracranial Pressure Using Comsol Multiphysics

X.G.Li¹, H.von Holst^{1,2}, J.Ho¹ and S.Kleiven¹

¹KTH - Royal Institute of Technology, Division of Neoronic Engineering

²Karolinska Institute, Department of Clinical Neuroscience

*Corresponding author: Alfred Nobels Allé 10 141 52 Huddinge, Sweden , xiaogai.li@sth.kth.se

Abstract: Brain edema is one of the most common consequences of serious traumatic brain injuries which is usually accompanied with increased intracranial pressure (ICP) due to water content increment. A three-dimensional finite element model of brain edema is used to study intracranial pressure in this paper. Three different boundary conditions at the end of cerebral spinal fluid (CSF) were used to investigate the boundary condition effects on the volume-pressure curve based on the current model. Compared with the infusion experiments, results from the simulations show that exponential pressure boundary condition model corresponds well with the experiments.

Keywords: Brain edema, Intracranial pressure(ICP), Consolidation