

## **ABSTRACT**

*Brain tumor is a disease of the brain due to the proliferation of normal cells into abnormal ones. Brain ECVT (Electrical Capacitance Volume Tomography) was developed to be one of the detection tools in the medical world based on imaging techniques, does not damage the physical object being observed, and forms an image of the object in a capacitive multi-electrode sensor. The working principle of ECVT is to measure the capacitance through a series of capacitive electrodes on the head object (forward problem) and reconstruct the image of the permittivity distribution (inverse problem). Normalization of capacitance data is performed before the image reconstruction stage. In normalization, the prediction of the actual permittivity based on the measured capacitance is difficult to ascertain. The nonlinearity between the electrodes causes the measured permittivity and capacitance to increase in the measurement pair. To overcome this condition, it is necessary to normalize the measured capacitance data of the examined object statically so that the actual capacitance and measured capacitance results show the linear condition of the examined medium. This study aims to compare the methods of normalization namely parallel, maxwell, and exponential to obtain accurate normalization results, then reconstruct brain tumor images. Measurement data was simulated using matlab and comsol multiphysics software. Comparison of normalization methods was measured through testing correlation coefficient (CC), image error (IE), root mean square error (RMSE), and image reconstruction. The results show that the exponential method is the most accurate method in normalizing capacitance data that shows linear conditions for imaging brain tumor cases. The order of the highest average CC value includes parallel results of 0.4017, maxwell of 0.3728 and exponential of 0.3728. The order of the lowest IE mean values includes exponential results of 0.8441, parallel of 1.089, and maxwell of 1.0919. The order of the lowest RMSE mean value includes exponential of 3.905, parallel of 3.9512, and maxwell of 4.4793.*

**Keywords:** *Brain tumor, Electrical Capacitance Volume Tomography (ECVT), normalization method, image reconstruction, static.*