

An investigation of the effect of different number of electrodes on EIT reconstructed images

ABSTRACT

Electrical Impedance Tomography (EIT) is an imaging technique which is used in both industrial process and medical imaging, as it is non-invasive and versatile. One of the factors that contribute to image quality is electrode. This work investigates the effect of the different number of electrodes on EIT reconstructed images for various widths of electrodes. Spectral analyses, sensitivity analyses and spatial resolution analyses were used to study the influence of the different numbers of electrodes for different electrode widths. From the results of spectral analysis, the magnitude of singular value is higher as the number of electrodes increases, which indicates higher stability of measurements obtained. On the contrary, the percentage of stable measurements decrease significantly as the number of electrodes increase. In the sensitivity analyses, the results show that there are noticeable differences in sensitivity magnitude for models with the different number of electrodes. However, when comparing models with the same number of electrodes but with different widths, there are negligible differences. From the spatial resolution analyses, the results are inconclusive as the spatial resolution produced is fairly similar for models with the different number of electrodes for fixed electrode widths. This trend is observed when comparing models with the same number of electrodes but with different electrode widths. All these analyses have to be considered when deciding on electrode configuration, taking into account the influences of both the number of electrodes and the dimension of electrodes used.