ABSTRAK

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Pencitraan volumetric berdasarkan prinsip electrical capacitance tomography (ECT), dinamakan electrical capacitance volume tomography (ECVT), telah dikembangkan dalam penelitian ini. Teknik yang digunakan berawal dari pengukuran kapasitan diseluruh geometri benda volumetrik tiga dimensi yang diliputi sensor kapasitan. Pengembangan ini memungkinkan real-time pencitraan volume bergerak (4 D). Pengembangan dari teknik pencitraan ECVT meliputi 3-D desain sensor untuk mendapatkan citra yang optimal dan teknik rekonstruksi pencitaraan volum. Teknik rekonstruksi gambar dimodifikasi oleh algoritma 3-D matrik sensitivitas. Distribusi sensitivitas sangat mempengaruhi citra yang dihasilkan. penelitian ini telah dilakukan dengan simulasi dan komputasi medan listrik pada software COMSOL Multiphysics yang berdasarkan metode element terbatas dan dihitung dalam MATLAB 2007b serta di ujicobakan melalui alat.

Kata kunci :
Electrical Capacitance Volume Tomography (ECVT), Desain Sensor, Sensitivitas matrik, COMSOL Multiphysics, MATLAB 2007b.

ABSTRACT

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Judul : The Development of Three Dimensional Sensor Design on Electrical Capacitance Volume Tomography (ECVT) : Experiment with a Part of Human Body

A dynamic volume imaging based on the principle of electrical capacitance tomography (ECT), namely, electrical capacitance volume tomography (ECVT), has been developed in this research. The technique generates, from the measured capacitance, a whole volumetric image of the region enclosed by the geometrically three-dimensional capacitance sensor. This development enables a real-time, 3-D imaging of a moving object or a real-time volume imaging (4-D) to be realized. The development of the ECVT imaging technique primarily encloses the 3-D capacitance sensor design to get the optimum image and image volume reconstruction technique. The image reconstruction technique is modified by introducing into the algorithm a 3-D sensitivity matrix. The Distribution of sensitivity affects the produced image. The research is done with the simulation system and computational electric field in COMSOL Multiphysics software that is based in a finite element method and calculated in MATLAB 2007b and is examined with hardware.

Key words :
Electrical Capacitance Volume Tomography (ECVT), Sensor Design, Sensitivity Matrix, COMSOL Multiphysics, MATLAB 2007b.