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Perancangan sistem volumetric magnetic induction tomography menggunakan 8 koil pemancar dan 8 koil penerima = System design of volumetric magnetic induction tomography by using 8 coils as transmitter and 8 coils as receiver / Muhammad Nurul Puji

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Abstrak

[ABSTRAK
Telah dibuat sistem volumetric magnetic induction tomography (VMIT) menggunakan 8 koil pemancar dan 8 koil penerima. Adanya eksitasi sinyal sinus pada koil transmitter menimbulkan medan magnet yang berubah-ubah sehingga menimbulkan ggl induksi pada koil receiver. Besarnya medan magnet induksi ini juga dipengaruhi oleh permeabilitas medium antara koil pemancar dan penerima. Simulasi COMSOL dan MATLAB pada sistem VMIT 8 koil menunjukkan bahwa dengan menggunakan algoritma ILBP objek berbentuk bola dengan permeabilitas logam besi dapat direkonstruksi sehingga menghasilkan citra yang serupa. Dari hasil simulasi ini kemudian dibuat prototipe sistem akuisisi data VMIT. Prototipe sistem VMIT yang dibuat diuji coba untuk mengenali objek logam berbentuk silinder seperti kaleng cat semprot dan besi pejal. Hasil rekonstruksi citra dapat mendeteksi keberadaan objek logam dengan diameter minimal 3 cm dan panjang 10 cm, namun citra masih terlihat kurang jelas. Secara keseluruhan pengambilan data dengan menggunakan prototipe sistem VMIT ini cukup stabil yaitu dengan rata-rata persentase standar deviasi adalah 0,75%.
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ABSTRACT
Volumetric magnetic induction tomography (VMIT) system has been developed by using 8 coils as transmitter and 8 coils as receiver. The existence of sine excitation signal in the transmitter coil cause magnetic field changing, it causing emf at the receiver coil. The magnitude of the magnetic field induction is also influenced by the permeability of the medium between the transmitter and receiver coils. COMSOL and MATLAB simulation of VMIT 8 coil systems indicate that by using ILBP algorithms, ball shaped object with ferromagnetic materials (iron) can be reconstructed to produce a similar image. According to the simulation results are then made prototypes of a data acquisition system of VMIT. The prototype of VMIT system can recognize a cylindrical objects of ferromagnetic materials such as solid iron and tin paint sprayer with 10 cm of length and minimum 3 cm of diameter. The results of image reconstruction can indicate the presence of the cylindrical object. Overall the collection of data by using a prototype of VMIT system is quite stable and the average standard deviation is 0.75%., Volumetric magnetic induction tomography (VMIT) system has been developed by using 8 coils as transmitter and 8 coils as receiver. The existence of sine excitation signal in the transmitter coil cause magnetic field changing, it causing emf at the receiver coil. The magnitude of the magnetic field induction is also influenced by the permeability of the medium between the transmitter and receiver coils. COMSOL and MATLAB simulation of VMIT 8 coil systems indicate that by using ILBP algorithms, ball shaped object with ferromagnetic materials (iron) can be reconstructed to produce a similar image. According to the simulation results are then made prototypes of a data acquisition system of VMIT. The prototype of VMIT system can recognize a cylindrical objects of

ferromagnetic materials such as solid iron and tin paint sprayer with 10 cm of length and minimum 3 cm of diameter. The results of image reconstruction can indicate the presence of the cylindrical object. Overall the collection of data by using a prototype of VMIT system is quite stable and the average standard deviation is 0.75%.]