# Analisis level konsistensi data set keluaran sensor kapasitif frekuensi jamak = Consistence level analysis of a multi frequency capacitive sensor

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Abstrak

Pendekatan Impedance Spectroscopy(IS) banyak digunakan dalam mendeteksi karakteristik suatu materi. Salah satu metode pemanfaatannya adalah pendeteksian properti menggunakan sinyal white noise. Metode ini memanfaatkan pendekatan pada frekuensi spektral noise/derau dari sinyal domain frekuensi hasil dari pengaruh medan pada dielektrik. Pada skripsi ini akan ditampilkan sebuah alat bernama?Multi-frequency Capacitive Sensor (MCS) yang dibentuk berdasarkan konsep White Noise Impedance Spectroscopy. Namun sebelum dapat digunakan sebagai sensor, tentunya sebuah sistem kerja yang tepat sudah harus ditetapkan demi mencapai konsistensi yang tinggi pada setiap pengukuran.
Peneliti mengkaji konsistensi tersebut dengan mengubah sistem sensor, yakni: 1. Resistansi pada sistem sensor; 2. Suplai Amplifier pada sistem sensor; dan faktor eksternal lainnya yang dapat memengaruhi.Penelitian dilakukan terhadap material campuran H2O dan HCl 5 Molar sebanyak 300 data untuk masing-masing percobaan. Data diolah melalui program MatLab, kemudian dapat dianalisis secara kualitatif dan kuantitatif. Secara Kualitatif data diamati melalui grafik tiga dimensi yang merepresentasikan fluktuasi amplitudo dalam frekuensi inti dan frekuensi spektral.
Secara kuantitatif data diamati berdasarkan nilai konsistensi fluktuasi amplitudo pada MF(Mean Fluctuation), HF(High Fluctuation) dan HHF(High-High Fluctuation) dan fluktuasi Varian to Mean Ratio (VMR). Dari metode analisis yang telah dilakukan, didapatkan sensor MCS yang memiliki konsistensi mendekati 99%. Hal ini merupakan pencapaian yang amat tinggi, diduga perbandingan antara 2 material yang berbeda sudah dapat dilakukan. Kedepannya dapat ditentukan titik terjadinya perubahan dikarenakan ion Na+ dan Cl- dalam larutan campuran H2O+HCl dan H2O+NaOH.
<hr><i>Impedance Spectroscopy has been a well known method that popularly used in detecting porperties of materials.One of its applicative methood is properties detection by harnessing a white noise signal. This method utilize the apporach of a spektral noise from the frequency domain which is a result of field effect to the dielectric area. This method of detection introduces a Multi-spectral approach, complex data analysis, and a relatively fast and accurate measurements.This thesis will introduce an instrument called Multi-frequency Capacitive Sensor which concept is based on EIS. However, before it can function as a sensor, we certainly need to creat a functioning working system in order to gain a high consistency in every measurements.
The author observe the consistency level by changing the sensor systems, which is; 1) Resistance in the sensor system, 2) Amplifier supply in the sensor system, and 3) other external factor which may affect it?s work function. This research is done on an admixture of H2O+HCl5M with 300 data gained by each procedure. These data?s then processed using MatLab, which then we can analyze qualitatively and quantitatively. A qualitative observation is done by observing a 3D graphics which represents amplitude fluctuation in a gicen frequency and a range of spectral frequency.
Quantitatively data is observed by the consistency level of amplitude fluctuation in MF(Mean Fluctuation),

HF (High Fluctuation) and HHF( High High Fluctuation) and also the Varian to Mean Ratio(VMR) fluctuation From these methods which has been done, a MCS with a consistency close to 99% is gained. This is a really good achievement, with a high consistency level, a comparison between 2 materials can be done. For future research we hope that MCS can define the point of changes in the system caused by a change of ion Na+ dan Cl- in the admixture of H2O+HCl and H2O+NaOH.</i>