The Effects of Inductor Resistance on Defibrillation Energy from Electrocardiograph Endurance Test System

Abstract

Electrocardiograph endurance test system has two work processes like a defibrillator. Charging process produces energy stored in a capacitor ($E_s$), while discharges process produces defibrillation energy. The value of defibrillation energy without any connection to the electrocardiograph ($E_2$) at test system is influenced by the resistance values of the inductor ($R_l$). In previous research, test system only produced $E_2 = 19.83$ joule, This was caused by the inductor used with $R_l$ value $= 72 \ \Omega$. The purpose of this research is to select inductor resistance value to get the best and the most efficient $E_2$ value. Range value used in test system was $1–10 \ \Omega$, which was based on International Electrotechnical Commission (IEC) 60601-2-27 clause 201.8.5.5.2 standard. Every $R_l$ measured voltage on $100 \ \Omega$ point at interval time ($\Delta t$) $= 0.02$ ms was obtained from Multisim software simulation. The result of the simulation indicated that if peak voltage increased, then the used $RL$ value was approaching zero. On the other side, measured Voltage data was used as a parameter in total $E_2$ calculation every range of $R_l$ value, then result of $E_2$ total calculation was compared to $E_s$ value to achieve energy ratio value. $R_l$ value $= 1 \ \Omega$ was the most efficient because it could generate energy ratio around $98.45\%$ with $E_2 = 393.80$ joule, while energy ratio when $R_l$ value $= 10 \ \Omega$ was not very efficient because it only generated energy ratio around $89.58\%$ with $E_2 = 358.33$ joule.

Keywords: Defibrillation energy, Inductor resistance, Multisim simulation, Efficient.

Reynolds Number Estimation of Rotameter Based on K-Epsilon Model

Abstract

Measurement of fluid flow with the aid of a floating element (rotameter) is a simple method used to measure the velocity of the fluid with a better degree of accuracy. However, there is still a tendency for turbulence flows around the floating element (annular area) due to narrowing of the flows area and the geometry shape of the floating element that can reduce the level of the rotameter accuracy. A single phase of turbulent flows through rotameter was estimated using k-epsilon turbulence model. A detailed study has been performed to investigate the influence of turbulence characteristics from the Reynolds Number (Re) as a benchmark for predicting the level of turbulence. The results showed that at the velocity of 800 l/h the level is around 450, which showed that the fluid flow on the rotameter is categorized as turbulence.

Keywords: Rotameter, Velocity, K-epsilon, Reynolds number.
**Single Master – Multiple Slaves Microcontroller Implementation for Sending and Receiving Data on Weather Station Prototype**

Widyariset Vol. 3, No. 1, Mei 2017, page: 19-34

**Abstract**

We have carried out the microcontroller research implementation as a Master to control multiple Slaves microcontroller on weather station prototype. Master Microcontroller could be interconnected with four Slaves microcontrollers Slaves, in which each has a different type of input. In this research, we used an ATmega8535 microcontroller. To distinguish between a Slave microcontroller and another Slave microcontroller, an addressing system (ID) is used. Data communication used a standard serial port RS-232 and RS-485 ports, the connector is used to connect the two ports. The Single Board Controller (SBC) Master serves user commands from users, sending the commands and processing Slaves. User commands are given via the keypad and then transmitted using a Universal Asynchronous Receiver-Transmitter (USART) to SBC Slaves. The process on the SBC Slaves is waiting for orders from the Master. The order is detected using an interrupt. After that, the commands are processed and the respond is sent to the SBC Master via USART. When there is no command, Slaves do the idle process. The result shows that the microcontroller application single Master - multiple Slaves has functioned for sending and receiving data in accordance with the specified command. This is shown by the output on a display that has shown the result as expected. The power consumption of each SBC is relatively small which is 0.745 Watt. Thus, it makes the system more economically profitable.

**Keywords:** Microcontroller, ATmega8535, Master, Slave, Single board controller.

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**Formulation of Chitosan Membrane Composition and Stirring Optimization for Reducing Total Solid of Palm Oil Mill Effluent**


**Abstract**

Palm oil mill effluent (POME) is palm oil industry wastewater with high solid content. Waste filtration using chitosan membrane has been investigated to decrease the solid waste, but the final value have not met the quality standards yet. Therefore, further development of formulation and optimization of the membrane manufacturing process (composition and stirring speed) are needed. The purpose of this study was to determine the effect of composition and stirring speed on the performance of the membrane in decreasing the solid content of POME. Chitosan membrane was prepared by phase inversion method with two supporting materials, namely Poly Ethylene Glycol (PEG) and Poly Vinyl Alcohol (PVA). The variables of this experiment were Chitosan: ratio PVA (40:60, 45:55, 50:50, 55:45 and 60:40 (v/v)) and stirring speed (200 rpm and 250 rpm). Chitosan composite membrane was tested in a cross flow reactor system. The result showed that the highest rejection values of TSS and TDS generated by the membrane on the chitosan and PVA ratio of 50:50 (v:v) at stirring speed of 250 rpm were 96.84% and 97.23%, respectively.

**Keywords:** Chitosan membrane, POME, Solid rejection, TSS, TDS.

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**Thermomechanical Treatment Process of α/β Ti-6Al-6Mo Alloy as New Alternative Materials for Biomedical Application**

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**Abstract**

Ti-6Al-6Mo has been casted by arc remelting furnace and followed by thermomechanical processing homogenization and hot rolled at 900, 1,000, and 1,100 °C. Ti-6Al-6Mo plate, the product of hot rolled, was characterized using optical microscope and electron microscope to identify the microstructure. X-ray diffraction was conducted to identify phase. Hardness test was conducted by Rockwell method to confirm hardness value of Ti-6Al-6Mo plate. The microstructure of as rolled Ti-6Al-6Mo was α titanium and deformed β titanium. The α and β phase were observed by X-ray diffraction pattern. The hardness value showed the highest hardness value reached at 1.100 °C.
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**CHARACTERISTICS OF ORGANIC AND NUTRIENT REMOVAL ON LOOP BIOFILTER SYSTEM FOR PEAT WATER AND WASTEWATER TREATMENT**


**Abstract**

Domestic wastewater pollution in the watershed area which has ecologically sensitive area, such as peat water, can be resolved by water management that combines raw water treatment and wastewater treatment with closed loop system on a community scale. This paper describes the removal characteristics of organic and nutrient in biofilters loop system to treat raw water that contains color <300 units PtCo, COD 102-116 mg/L, and domestic wastewater. Water treatment system which consists of a biological treatment and multimedia filtration is used to supply drinking water and to conduct wastewater treatment on a community scale by using the potential of ecosystems and chemical-physical characteristics of peat. The study was conducted by applying method of field scale to serve 50 families and method of performance evaluation models based on approach of first-order kinetics plug flow and Kadlec and Knight k-C* model. The case study is located in downstream of Siak watershed areas, as one of the national strategic watersheds, which is packed with urban slum areas with low access to surface water utilization and good sanitation infrastructure. Water treatment unit that consists of peat biofilter systems, hybrid aerobic biofilter, and zeolite cation-anion filtration can support water supply in public sanitation facilities. The biofilters loop model for wastewater treatment consists of hybrid Upflow Anaerobic Sludge Blanket (UASB), biofilters, and constructed wetlands which its media is a combination between porous media and peat soils. At steady state, the removal of organic and nitrogen is larger than 90%.

**Keywords:** Peat, Organic, Nutrient, Biofilters loop, Wastewater, Community.

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**AC POWER CALIBRATION ON POWER QUALITY ANALYZER USING A MULTIPRODUCT CALIBRATOR**


**Abstract**

AC power calibration on power quality analyzer by using indirect method has been developed in Research Center for Metrology, Indonesian Institute of Science (LIPI). The measurement was performed by applying input voltage and input current from a standard multiproduct calibrator. Before being transferred to a power quality analyzer, the input current is passed first to the current coil to adapt the measuring range of the coil clamp of the power quality analyzer. Data collection and evaluation to determine the correction and uncertainty were carried out separately and alternately per phase. The analysis to evaluate the measurement correction and uncertainty was developed by considering the parameters that form the AC power, such as voltage, current, and phase angle. Based on the result of the calibration data analysis, it was obtained 3% of correction by the greatest measurement uncertainty of 1.92% at confidence level of 95% and coverage factor k=2.

**Keywords:** Power quality analyzer, Current coil, AC power, Calibration, Uncertainty.

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**CORAL REEFS**


**Abstract**

Coastal development in Ambon Bay led to increased sedimentation and pollutant into the waters. It effects on the organism in Ambon Bay, including coral reefs. This study aims to look the condition of coral reef. The study method is Line Intercept Transect (LIT) in eight observation stations, two stations in the inner bay and six stations in the outside bay. The results showed there has been a decline in coral cover in the area that has development activities and high anthropogenic activity like Hative Besar, Poka, Kota Jawa, Halong, and Hunuth station. As for areas that have lesser development activity and anthropogenic activity, the condition of coral cover increased as happened at Lilibooy, Eri, and Batu Capeu stations. Stations that have coral reefs “very good category” is at St.
Eri station, “good category” is at St. Lilibooy station, “medium category” is at St. Kota Jawa station and St. Batu
Capeu while “bad category” are at St. Hative Besar, St. Poka, St. Halong and St. Hunath stations. Coral growth at
each station is dominated by a non-acropora group. The life forms are massive corals and submassive corals from
Porites, Favites, Platygyra, Millepora, Symphyllia, Lobophyllia, Styphora and Pavona genus.

**Keywords:** Condition status, Coral reef, Line Intercept Transect (LIT), Ambon Bay.