



INCREASING THE EFFICIENCY OF ULTRASONIC DISPERSION SYSTEM WITH USE OF CONTROL LOOP TO AUTOMATIC FREQUENCY ADJUSTING

J. Abbaszadeh, H. Abdul Rahim*, E. Najafiaghdam, R. Abdul Rahim, S. Sarrafi

Control and Instrumentation Engineering Department,

Faculty of Electrical Engineering, Universiti Teknologi Malaysia,

81310 Skudai, Johor, Malaysia

Emails: JAB@fkegraduate.utm.my, herlina@fke.utm.my*, najafiaghdam@sut.ac.ir,
ruzairi@fke.utm.my

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Abstract- A novel ultrasonic dispersion system for the dispersing of particles which are mixed in liquid has been proposed in this paper. The frequency of produced ultrasonic wave varies from 30 kHz to 60 kHz with 100 Hz steps. It means that the operating frequency band of designed system is 30 kHz. The maximum and optimum energy of ultrasonic wave can be transfer inside the liquid container with the high efficiency in majority of operating time by the use of some facilities which are implemented in our novel system, so it causes one of the superiority of manufactured system in compare with the other similar systems which are available in markets. Ultrasonic transducers which are used in this system as the generator of ultrasonic wave is the type of air coupled ceramic ultrasonic piezoelectric with the nominal maximum power 50 watt. By the considering of

frequency diagram of applied piezoelectric, it can be find out that the piezoelectrics produce the maximum amplitude of ultrasonic wave on their resonance frequency, so this system is designed to work on resonance frequency of piezoelectric, continuously. This is done by the use of control system which is consisted of two major parts, sensing part and controlling part. A Hall Effect current sensor is used as the sensing part and the controlling program is implemented on AVR microcontrollers. In addition, the control algorithm of program is presented in this paper. The manufactured ultrasonic dispersion system has been consisted of 9 piezoelectrics so that it can produce 450 watt ultrasonic energy, totally.

Index terms: Ultrasonic dispersion, frequency adjusting, Transducer, high power ultrasonic, nanoparticles.