Techaniti Chantakien 2012: A Design of A MEMS Based Confocal Probe for Multiple Wavelengths. Master of Engineering (Information and Communication Technology for Embedded Systems), Major Field: Information and Communication Technology for Embedded Systems, Department of Electrical Engineering. Thesis Advisor: Mr. Pisut Raphisak, Ph.D. 62 pages.

The performance of the microelectromechanical systems (MEMS) based single axis confocal microscope is greatly limited due to chromatic ion when it is used with multiple wavelengths and nonlinearity MEMS scanner's operation. The purpose of this study, there are two purposes, is to reduce chromatic aberration in a single axis confocal microscope probe for multiple wavelengths. Another purpose of this study is to propose a method to linearize the scanning field in open-loop operation.

To reduce chromatic aberration in single axis confocal microscope probe, the achromatic lenses which are designed to reduce the effects of chromatic aberration are used as beam expander and objective lens. To linearize scanning field, the utilization of Radial Basis Function (RBF) neural networks to control MEMS scanner are proposed. The Radial Basis Function neural networks are created from data sets archived from MEMS scanner's characteristic imulation. However, the accuracy of RBF neural network depends on hidden node. Therefore, RBF neural network's performance is measured via mean squared error value. From the experiment, the RBF neural networks which have mean squared error less than 0.05 can be used to control MEMS scanner in MEMS based sing axis confocal microscope.

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