A Study on the Dynamic Characteristics of An ER Fluid Controlled Inkjet Printhead with Two Output Units

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ABSTRACT

The demand for fast printing, high quality and low cost printer has increased steadily since the use of personal computers became a necessity of the daily life. In this thesis, a novel array-type inkjet printhead utilizing the tunable viscoelastic property of the electro rheology fluid as a control value mechanism is studied. The static characteristics of this ER value is modelled theoretically and its major design parameters are identified thereafter. In addition, by applying electric field upon the concentric electrodes of the ER value, the controllability of the ink ejection due to the change in the stiffness and damping properties of the ER fluid is investigated experimentally. It is found that the cross-talk between two output units is insignificant in this design setup and therefore, two units can be operated independently. Finally, the transient responses of the output fluid chamber under the pulse-type controlled electric field with different duty time and phase are measured. It is concluded that under the sinusoidal excitation of the displacement amplitude of 0.3mm, frequency of 10Hz, the output chamber has minimal response as the controlled electric field is of the magnitude 533V/mm, duty time of 0.06s and zero phase lag.

Keywords : Electro-Rheological Fluid ; ER Fluid Valve ; Inkjet

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