Preliminary Study of Using ER Fluids in Ink-jet Printhead

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ABSTRACT

The demand for non-impact printers has grown considerably with the advent of the personal computer. At the low end, two drop-on-demand techniques predominate the market — piezoelectric impulse and thermal-bubble types. However, the high cost of piezoelectric printhead and the thermal problems encountered by thermal-bubble jet printhead restrain the use of these techniques in array-type printhead. In this study, we propose a new design of printhead with ER fluid acting as a working medium. The ink drop is controlled by the ER fluid valve. This innovative design should not only solve the aforementioned technical problems of the state-of-art printheads, but also evade the patent right problem. As a first step toward developing this new printhead, the characteristic of an ER fluid valve which controls the deflection of the elastic diaghram is investigated. Firstly, the discretized governing equation of the valve is derived. Then, the prototypes of the ER valve is designed and fabricated. The experimental measurement based on the sinusoidal response should verify the theoretical analysis. Finally, the dynamic response of the valve is studied experimentally to prove the feasibility of using this ER valve for the ink-jet printhead.

Keywords : ER Fluid ; ER Fluid valve ; Ink-jet Printhead

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