Electrostatic Microactuator Design Using Surface Acoustic Wave Devices

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Abstract An integration of low power operated Surface Acoustic Wave (SAW) devices with the electrostatic microactuators for microfluidic and similar applications is presented in this chapter. Passive, low power, and small area devices can be interrogated wirelessly using SAW devices, which can respond to a uniquely coded signal for a secure and reliable operation. The novel approach relies on converting the interrogating coded signal to surface acoustic wave that is then correlated with an embedded code. A theoretical analysis of how the actuation mechanism operates is carried out and simulation results of the new microactuator are discussed. At the initial analytical stage, for simplicity, a basic SAW delay line structure is used to generate an electrostatic field between output interdigital transducer (IDT) of the SAW device and a thin conductive plate (actuator), which is placed on top of the output IDT. The static and transient displacement analysis of the actuator is carried out using ANSYS simulation tools. A comparison between the static displacements obtained from ANSYS based simulations and Rayleigh-Ritz based analysis is also presented and discussed.

Keywords SAW device · wireless · microactuator · electrostatic · IDT · ANSYS

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