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Acoustically Generated Flows in Flexural Plate Wave Sensors: a Multifield Analysis ERSIN SAYAR, BAKHTIER FAROUK, Department of Mechanical Engineering and Mechanics, Drexel University — Acoustically excited flows in a microchannel flexural plate wave device are explored numerically with a coupled solid-fluid mechanics model. The device can be exploited to integrate micropumps with microfluidic chips. A comprehensive understanding of the device requires the development of coupled two or three-dimensional fluid structure interactive (FSI) models. The channel walls are composed of layers of ZnO, Si_3N_4 and Al. An isothermal equation of state for the fluid (water) is employed. The flexural motions of the channel walls and the resulting flowfields are solved simultaneously. A parametric analysis is performed by varying the values of the driving frequency, voltage of the electrical signal and the channel height. The time averaged axial velocity is found to be proportional to the square of the wave amplitude. The present approach is superior to the method of successive approximations where the solid-liquid coupling is weak.

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