Indirect Adaptive Control of Micro Fluid Systems

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Digital microfluidics systems require advanced controllers to operate accurately because their parameters are subjected to change in environment and over time. Most of their fabricated system parameters are different from the destined values. Hence, estimation based controllers are required to identify the system parameters and control the droplet dispensing. This poster describes the application of an indirect adaptive trajectory controller for digital Pico-Droplet dispensing system. Forgetting factor recursive least square estimator is used to estimate the system parameters including capacitance and resistance of the occupying droplet between electrodes. This research presents indirect adaptive controller as a technique to measure and control the droplet volume on the dispensing electrodes. Simulations of the estimator, tracking performance of dispensed droplet volume and the controller's control effort are provided to demonstrate an accurate and high performance control approach.

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