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Actuator Waveform Design using Nonlinear Adjoint Looping on the Acoustic Flow in an Inkjet Printhead[1] MATTHEW JUNIPER, PETR KUNGURTSEV, Univ of Cambridge — In inkjet print heads, piezo-electric actuators along one side of a 100 micron channel eject pico-litre droplets from a nozzle on the other side of the channel. After ejection, the acoustic reverberations in the channel must die away before a new droplet can be ejected. It takes several hundred microseconds for the reverberations to die away naturally so, instead, open loop control of the actuator is used to eliminate the reverberations. The current state of the art is to design this waveform with trial and error on several thousand experiments. In this study we instead use nonlinear adjoint looping of a numerical simulation of the acoustic flow in the channel in order to converge to the optimal actuator waveform. In doing so, we identify the physical mechanism through which the reverberations are eliminated and find the minimum time required for this.

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