Experimental control of a fluidic pinball using genetic programming

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The wake stabilization of a triangular cluster of three rotating cylinders was investigated in the present study. Experiments were performed at Reynolds number $Re \sim 6000$, and compared with URANS-2D simulations at same flow conditions. 2D2C PIV measurements and constant temperature anemometry were used to characterize the flow without and with actuation. Open-loop actuation was first considered for the identification of particular control strategies. Machine learning control was also implemented for the experimental study. Linear genetic programming has been used for the optimization of open-loop parameters and closed-loop controllers. Considering a cost function $\mathscr{J}$ based on the fluctuations of the velocity measured by the hot-wire sensor, significant performances were achieved using the machine learning approach.