Abstract Submitted
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**High Amplitude Forcing Dependence of Control of a Backward-Facing Step Flow**[1] LORENZ SIGURDSON, MARC SCHOSTEK, University of Alberta — An experimental study was conducted of a forced backward-facing step water flow, which required the design of 16 piston actuators. They allowed spanwise-varying forcing with a resolution of 0.5 times the step height h. They were capable of producing unique perturbation waveforms of forcing velocity amplitudes $0 < u'/U_\infty \leq 2$, and forcing Strouhal numbers based on h in the range $0 < St_h \leq 1.0$. These forcing amplitudes are larger than those used in known previous forced backward-facing step flow experiments. For measurement of the reattachment length a hydro-tuft was designed which indicated flow direction. A set of images taken of an array of tufts was processed to calculate a time-averaged reattachment line. Initial experiments were for spanwise-invariant forcing for the full amplitude range and forcing frequencies of $0 < St_h \leq 0.5$. The results showed an optimal $St_h$ which shifted to a lower value with increasing forcing amplitude, and a non-monotonic shortening of the reattachment length. As a function of forcing amplitude, reattachment reached a pronounced local minimum at $u'/U_\infty \approx 0.3 - 0.4$, and then rose to a local maxima at a $u'/U_\infty \approx 0.5 - 0.6$. Larger forcing amplitudes caused even more shortening than the local minimum.

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