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Dynamic Modeling and Feedback Control of a Synthetic Jet-like Compression Driver Actuator[1] KIHWAN KIM, MARCO DEBIASI, ANDREA SERRANI, MOHAMMAD SAMIMY, The Ohio State University — This research is focused on dynamic modeling and feedback control of a synthetic jet-like compression driver actuator, which has been successfully employed for feedback control of subsonic cavity flows. The pressure response of the actuator is linear with distinctive frequency-dependent behaviors. In order to develop the dynamic model of the actuator considering time delay, a subspace-based identification method is implemented using experimental frequency response data. The order of the identified model is reduced by balanced realization. The reduced-order model preserves the key characteristics of the actuator within the frequency band of cavity oscillation where the actuator operates. The feedback control of the actor is aimed at having the pressure response of the actuator track the reference. It benefits the overall cavity control loop by mitigating uncertainties resulted from the actuator dynamics. To cope with the time-delay problem, the Smith-predictor structure is employed in conjunction with a H_∞ mixed- sensitivity method. The experimental results of the feedback control will be presented in the conference.

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