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The Lift Response of a Stalled Wing to Pulsatile Disturbances[1]
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The transient lift response of a low Reynolds number wing subjected to small amplitude pulsatile disturbances is investigated. The wing has a semi-circular planform, and is fully stalled at a 20° angle of attack. Micro-valve actuators distributed along the leading edge of the wing produce the transient disturbance. It is shown that the lift response to a single pulse increases with the square root of the increasing actuator supply pressure, and that the lift response curves are similar to each other when scaled by the total impulse. Furthermore, for fixed actuator supply pressure, the amplitude and total impulse of the transient lift response curve increases with increasing external flow speed. In this case the lift response curves are similar when scaled by the dynamic pressure. The lift response to a single pulse can be treated as a filter kernel, and can be used to predict the lift time history for arbitrary actuator input signals. Comparisons with multiple-pulse inputs and continuous actuation modulated at low frequencies show good agreement between the model predictions and the experiment.

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