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Mathematical Model for a Simplified Calculation of the Input Momentum Coefficient for AFC Purposes[1] DAMIAN HIRSCH, MORTEZA GHARIB, California Institute of Technology — Active Flow Control (AFC) is an emerging technology which aims at enhancing the aerodynamic performance of flight vehicles (i.e., to save fuel). A viable AFC system must consider the limited resources available on a plane for attaining performance goals. A higher performance goal (i.e., airplane incremental lift) demands a higher input fluidic requirement (i.e., mass flow rate). Therefore, the key requirement for a successful and practical design is to minimize power input while maximizing performance to achieve design targets. One of the most used design parameters is the input momentum coefficient C_μ. The difficulty associated with C_μ lies in obtaining the parameters for its calculation. In the literature two main approaches can be found, which both have their own disadvantages (assumptions, difficult measurements). A new, much simpler calculation approach will be presented that is based on a mathematical model that can be applied to most jet designs (i.e., steady or sweeping jets). The model-incorporated assumptions will be justified theoretically as well as experimentally. Furthermore, the models capabilities are exploited to give new insight to the AFC technology and its physical limitations.

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