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Active flow controller to extend laminar flow region on aircraft wing

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This study introduces Laminar Flow Control systems and employing the fundamental equations required, to achieve the required levels of suction across a wing to efficiently suppress flow. A novel system was designed that could be incorporated into the leading edge of large civil aircraft or adapted to suit alternative aircraft using a combination of active and passive suction methods. The active system uses electric or bleeds air powered turbo-compressors to provide the required levels of suction, whereas the passive system automatically produces suction by introducing ducting from the high pressure region at the leading edge to the low pressure region at the underside of the wing. This method reduced the overall power requirement of the active system. Analysis of the design, including the impact of the system weight and fuel penalties found that the system could save over 5.5% of fuel during long-range flights, equivalent to up to 4,000 N of additional payload.

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