

# A Conceptual Study of Airfoil Performance Enhancements Using CFD

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**Abstract.** A conceptual study of performance enhancing devices for an airfoil is performed using Computational Fluid Dynamics. Three simple, passive devices are examined to explore alternate methods for stall control and lift-to-drag improvement. The motivation behind this research is to study effective techniques to improve performance with fewer drawbacks than previously existing methods. An evaluation scheme is presented to compute airfoil lift, drag and pitching moment for a range of angles-of-attack up to stall. NACA 64<sub>1</sub>-212 single-element and slatted airfoil CFD results are compared with experimental data to validate the computational model. Evaluations on the first conceptual design (Stall vane) show elimination of the separation at 15 degrees of angle-of-attack where the flow reversal normally starts at 86% - chord.