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Effect of Flow Control on the Mean Pressure Field over a NACA 4412 Airfoil MARLYN ANDINO, JULIE AUSSEUR, JEREMY PINIER, MARK GLAUSER, HIROSHI HIGUCHI, Syracuse University — We are applying real time closed loop separation control to the flow over a NACA 4412 airfoil using zero net-mass flow actuators. The feedback study involves analyzing the dynamics of the separating shear flow using low-dimensional methods and suppressing wing stall via zero net-mass flow actuators utilizing pressure sensors on the surface alone for input in feedback control. In this talk we will explore the effects of the interaction between the actuators and flow on the mean pressure distribution over the NACA 4412 airfoil. Our approach involves an application of the method developed by Honohan et al. (2003) in which they use PIV data coupled with the RANS equations to obtain the effect of the flow control actuation on the averaged pressure field. We have already demonstrated (Andino et al 2005) the utility of this approach on a NACA 4412 hydrofoil to help understand the global effects of flow control. We clearly see a major effect of the actuation on the mean pressure field backed out from the combined PIV/RANS approach. In this study we will present a similar application to higher resolution PIV data from a NACA 4412 airfoil, obtained at higher Reynolds number compared to the hydrofoil studies.

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