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On passive noise control in a tandem airfoil configuration using leading-edge serrations[1] SH SANKARASARMA VEMURI, XIAO LIU, BIN ZANG, MAHDI AZARPEYVAND, University of Bristol — This study focuses on experimental investigation of passive noise control for a tandem NACA 65-710 airfoil configuration by applying serrations to the leading edge of the rear airfoil. Wake-profile measurements on an isolated airfoil are used to determine the maximum turbulence intensity locations for the optimal positioning of the rear airfoil for near-field and far-field acoustic measurements. The far-field noise measurements and noise directivity analysis have demonstrated that the use of leading-edge serrations can lead to significant noise reduction from the tandem airfoil configuration. Near-field measurements have been carried out to understand the mechanism leading to the noise reduction by studying how surface pressure fluctuations vary over the serration root and tip planes. The near-field hydrodynamic analysis obtained using remote-sensing of the fluctuating pressure field over the airfoil has shown that the use of leading-edge serrations causes significant reduction in the unsteady aerodynamic load acting on the airfoil, particularly along the serration tip plane. This is believed to be due to a strong flow separation from the serration tip region. This study might have practical application for noise reduction from outlet guide vanes.

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