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Large-field PIV measurements of turbulent separation zone of Gaussian Bump validation geometry MATTHEW ROBBINS, MADELINE SAMUELL, ANTONINO FERRANTE, OWEN WILLIAMS, University of Washington — Turbulent separated flow modeling and simulation remain challenged in part, by a lack of validation datasets. Here we detail the first velocity field measurements over a Gaussian bump geometry developed in collaboration with Boeing. The bump tapers in the spanwise direction to minimize side-wall interactions. Upstream boundary layer conditions have been chosen to be applicable to wing-like configurations. A large test article is required to achieve Reynolds numbers based on a bump height of up to 290,000. To allow the acquisition of a large number of fields of view and the creation of composite statistical flowfields of approximately 2m by 30cm, PIV hardware are mounted to a streamwise-spanwise traverse. Comparisons are made with RANS simulations that match incoming boundary conditions and flow confinement, allowing the assessment of regions of modeling difficulty and the fidelity of standard RANS approaches. These initial flowfield measurements represent an ongoing effort to advance the validation readiness of this new geometry through new understanding of the separated region and detailed measurement and boundary condition uncertainty quantification.

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