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The Effects of Outer Flow Conditions on the Emergence and Evolution of Geometrical Self Similarity of a Bluff Body during Ablation[1]
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— The ablation process (i.e., erosion) of a bluff body, low-temperature ablator is investigated. Two experimental configurations in a heated open-circuit thermal boundary layer wind tunnel are considered: (a) the bluff body is supported in the free stream or (b) placed within the boundary layer growing on the bottom wall of the tunnel. These two configurations were chosen to investigate the effects of outer flow conditions (i.e. uniform in the free stream and varying with the boundary layer) on the emergence and evolution of geometrical self similarity during ablation. A time sequence of streamwise-transverse and streamwise-wall normal images were recorded. The images were analyzed to investigate the temporal evolution of the bluff body's projected area, perimeter, and curvature. The results were compared to similar studies where the erosion was caused from fluid shear force and chemical dissolution both of which scaled-similarly. The insights gained from this study can be used to progress towards physics-based models of bluff body ablation.

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