Abstract Submitted
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On the stability of a recirculation bubble and its application in compact combustion[1] MATT ANDERSON, PAUL STRYKOWSKI, University of Minnesota — A 2D channel flow expands asymmetrically via a sudden expansion splitter plate, the Reynolds number based on the channel height and mean velocity is 1.47 x 10^4. A recirculation bubble generated by a momenturm-driven counter flowing secondary stream located downstream of the sudden expansion is experimentally investigated by means of hot-wire anemometry and PIV. It is conjectured that the fluid field created is one of a separated region of locally absolutely unstable flow. This separated region is the result of both the partial stagnation of the main flow due to the spreading of the second counter-current flow as well as the entrainment of the secondary jet. The secondary stream augments the initial shear layer that has been created after the expansion and a separation bubble appears. This secondary jet creates a control mechanism for the fluid field. The low-velocity zone downstream of the expansion that has been created is necessary for flame anchoring, and the large turbulence levels recorded (total turbulence levels exceeding 100% of the inlet velocity) dramatically increase mixing and may lead to more efficient compact combustion in backward-facing step-combustors.

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