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Experimental Analysis of the Instability and Breakup of an Annular Liquid Sheet with Axial Co-flow DANIEL DUKE, JULIO SORIA, DAMON HONNERY, Laboratory for Turbulence Research in Aerospace & Combustion, Monash University — A novel application of a correlation-based velocimetry technique combined with high speed imaging has been employed to measure the interfacial stability properties of a thin annular liquid sheet with dual co-flowing axial gas streams undergoing aerodynamic breakup. The measurement of instabilities in thin liquid sheets has traditionally been limited due to the challenging complexities of taking measurements in the near-nozzle region where instability amplitudes are very small. Agreement with theoretical stability analysis has also proven elusive. The application of new techniques permits quantitative velocity measurement of with significantly improved resolution, for a more detailed analysis of the instability properties. Latest results are shown for the effects of inner and outer co-flow Re, sheet thickness and liquid Re on the aerodynamically driven instabily. Improved agreement with theoretical stability analysis is also shown. Improved techniques may afford a better understanding of the complex dynamics of sheet atomisation.

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