

Experimental and Computational Study of Trapped Vortex Combustor Sector Rig with Tri-Pass Diffuser



Experimental and Computational
Study of Trapped Vortex Combustor
Sector Rig With Tri-Pass Diffuser

NASA Technical Reports Server
(NTRS), et al., R. C. Hendricks

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BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 24 pages. Dimensions: 9.7in. x 7.4in. x 0.1in. The Trapped Vortex Combustor (TVC) potentially offers numerous operational advantages over current production gas turbine engine combustors. These include lower weight, lower pollutant emissions, effective flame stabilization, high combustion efficiency, excellent high altitude relight capability, and operation in the lean burn or RQL modes of combustion. The present work describes the operational principles of the TVC, and extends diffuser velocities toward choked flow and provides system performance data. Performance data include EINOx results for various fuel-air ratios and combustor residence times, combustion efficiency as a function of combustor residence time, and combustor lean blow-out (LBO) performance. Computational fluid dynamics (CFD) simulations using liquid spray droplet evaporation and combustion modeling are performed and related to flow structures observed in photographs of the combustor. The CFD results are used to understand the aerodynamics and combustion features under different fueling conditions. Performance data acquired to date are favorable compared to conventional gas turbine combustors. Further testing over a wider range of fuel-air ratios, fuel flow splits, and pressure ratios is in progress to explore the TVC performance. In addition, alternate configurations for the upstream pressure feed, including bi-pass diffusion schemes, as well as variations on the fuel injection patterns, are currently in test and evaluation phases. This item ships from La Vergne, TN. Paperback.

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