



Computational Study of the Impact of
Unsteadiness on the Aerodynamic
Performance of a Variable-Speed Power
Turbine

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Computational Study of the Impact of Unsteadiness on the Aerodynamic Performance of a Variable-Speed Power Turbine

By Gerard E. Welch

BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 28 pages. Dimensions: 9.7in. x 7.4in. x 0.1in. The design-point and off-design performance of an embedded 1.5-stage portion of a variable-speed power turbine (VSPT) was assessed using Reynolds-Averaged Navier-Stokes (RANS) analyses with mixing-planes and sector-periodic, unsteady RANS analyses. The VSPT provides one means by which to effect the nearly 50 percent main-rotor speed change required for the NASA Large Civil Tilt-Rotor (LCTR) application. The change in VSPT shaft-speed during the LCTR mission results in blade-row incidence angle changes of as high as 55°. Negative incidence levels of this magnitude at takeoff operation give rise to a vortical flow structure in the pressure-side cove of a high-turn rotor that transports low-momentum flow toward the casing endwall. The intent of the effort was to assess the impact of unsteadiness of blade-row interaction on the time-mean flow and, specifically, to identify potential departure from the predicted trend of efficiency with shaft-speed change of meanline and 3-D RANS mixing-plane analyses used for design. This item ships from La Vergne, TN. Paperback.



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