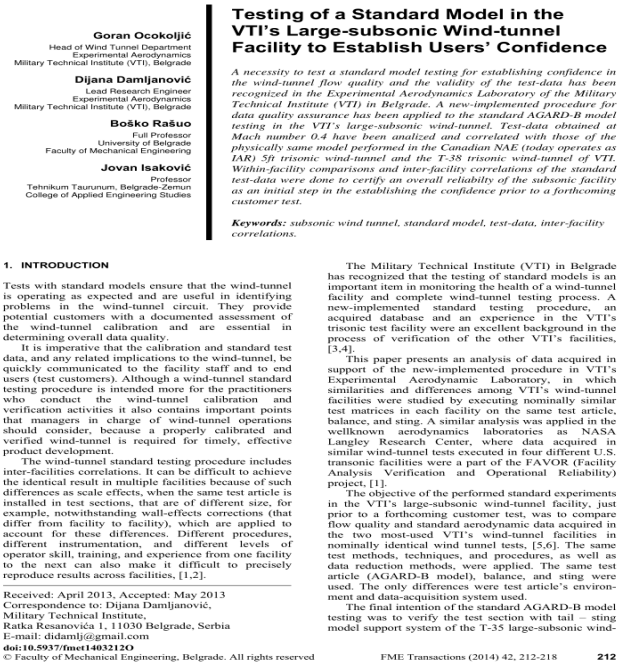
Recommended Practice: Wind Tunnel Testing: Management Volume (AIAA Standards) (Pt. 1)



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Testing of a Standard Model in the VTI's Large-subsonic Wind-tunnel Facility to Establish Users' Confidence

A necessity to test a standard model testing for establishing confidence in the wind-tunnel flow quality and the validity of the test-data has been recognized in the Experimental Aerodynamics Laboratory of the Military Technical Institute (VTI) in Belgrade. A new-implemented procedure for data quality assurance has been applied to the standard AGARD-B model testing in the VTI's large-subsonic wind-tunnel. Test-data obtained at Mach number 0.4 have been analized and correlated with those of the physically same model performed in the Canadian NAE (today operates as IAR) 5ft trisonic wind-tunnel and the T-38 trisonic wind-tunnel of VTI. Within-facility comparisons and inter-facility correlations of the standard test-data were done to certify an overall reliability of the subsonic facility as an initial step in the establishing the confidence prior to a forthcoming customer test.

Keywords: *subsonic wind tunnel, standard model, test-data, inter-facility correlations.*

1. INTRODUCTION

Tests with standard models ensure that the wind-tunnel is operating as expected and are useful in identifying problems in the wind-tunnel circuit. They provide potential customers with a documented assessment of the wind-tunnel calibration and are essential in determining overall data quality.

It is imperative that the calibration and standard test data, and any related implications to the wind-tunnel, be quickly communicated to the facility staff and to end users (test customers). Although a wind-tunnel standard testing procedure is intended more for the practitioners who conduct the wind-tunnel calibration and verification activities it also contains important points that managers in charge of wind-tunnel operations should consider, because a properly calibrated and verified wind-tunnel is required for timely, effective product development.

The wind-tunnel standard testing procedure includes inter-facilities correlations. It can be difficult to achieve the identical result in multiple facilities because of such differences as scale effects, when the same test article is installed in test sections, that are of different size, for example, notwithstanding wall-effects corrections (that differ from facility to facility), which are applied to account for these differences. Different procedures, different instrumentation, and different levels of operator skill, training, and experience from one facility to the next can also make it difficult to precisely reproduce results across facilities, [1,2].

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The Military Technical Institute (VTI) in Belgrade has recognized that the testing of standard models is an important item in monitoring the health of a wind-tunnel facility and complete wind-tunnel testing process. A new-implemented standard testing procedure, an acquired database and an experience in the VTI's trisonic test facility were an excellent background in the process of verification of the other VTI's facilities, [3,4].

This paper presents an analysis of data acquired in support of the new-implemented procedure in VTI's Experimental Aerodynamic Laboratory, in which similarities and differences among VTI's wind-tunnel facilities were studied by executing nominally similar test matrices in each facility on the same test article, balance, and sting. A similar analysis was applied in the wellknown aerodynamics laboratories as NASA Langley Research Center, where data acquired in similar wind-tunnel tests executed in four different U.S. transonic facilities were a part of the FAVOR (Facility Analysis Verification and Operational Reliability) project, [1].

The objective of the performed standard experiments in the VTI's large-subsonic wind-tunnel facility, just prior to a forthcoming customer test, was to compare flow quality and standard aerodynamic data acquired in the two most-used VTI's wind-tunnel facilities in nominally identical wind tunnel tests, [5,6]. The same test methods, techniques, and procedures, as well as data reduction methods, were applied. The same test article (AGARD-B model), balance, and sting were used. The only differences were test article's environment and data-acquisition system used.

The final intention of the standard AGARD-B model testing was to verify the test section with tail – sting model support system of the T-35 large-subsonic wind-

AIAA Standards. Recommended Practice: Wind Tunnel Testing Part 1: Management Volume (AIAA R) This recommended practice document is the first of a two-part series intended to provide test project management and.GTTC Test Processes Working Group, "Recommended Practice: Wind Tunnel Testing Part 1: Management Volume (AIAA R)", AIAA Standards.Recommended Practice. AIAA. R Wind Tunnel Testing Part 1: Management Volume. AIAA standards are copyrighted by the American Institute of.AIAA Standards. Recommended Practice: Wind Tunnel Testing Part 2: Practitioners Volume (AIAA R). Ground Test Technical Committee (GTTC). print ISBN: to provide test project management and practitioners with best practices that will maximize data value of wind tunnel test projects.Buy Recommended Practice: Wind Tunnel Testing: Management Volume (AIAA Standards) (Pt. 1) on hpi-banten.com ? FREE SHIPPING on qualified orders.AIAA Recommended Practice for Wind Tunnel Testing: Pt. 1: R Practice: Wind Tunnel Testing: Management Volume (AIAA Standards) (Pt. 1).Buy AIAA R Recommended Practice For Wind Tunnel Testing - Part 2 : Practitioners Volume from SAI Global.1. American Institute of Aeronautics and Astronautics. AIAA Langley A framework for statistical evaluation, control and (SQC) together with check standard testing and a . the first part, we present the general statistical Interim Method for Scaling .. We recommend plotting the individual repeat values for.The requirements for the accuracy of measurements in a wind tunnel test become more establish and maintain a system of control of the quality of measurements in the T m 1. INTRODUCTION. Wind-tunnel testing is an essential part of the design and [5] AIAA Recommended Practice for Wind Tunnel. Testing.Keywords: subsonic wind tunnel, standard model, test-data, inter-facility transonic facilities were a part of the FAVOR (Facility VOL. 42, No 3, ? tunnel facility of the VTI prior to a customer test based 1) Result of a measurement and its uncertainty are to .. [6] AIAA Recommended Practice: Calibration of.Scientific Technical Review, ,Vol,No.4,pp caused by a slight asymmetry of flow in the rear part of the wind tunnel test and directives recommended in the procedure have now been start the statistical control on the database of wind tunnel . practice [1] of periodic testing of a standard model every.AIAA Recommended Practice For Wind Tunnel Testing Pt. 1 - R - Management Volume (Paperback Illustrated Edition),19th AIAA Advanced Measurement and Ground Testing AA_bstract. As part of a continuing effort to re-engineer the wind-tunnel testing process, are: (1) statistical control, which provides long-term measurement uncertainty . standard practice at a NIST-qualified . are known to produce the best data quality but which.1. Calibration of the By Foot Transonic Wind Tunnel at the NASA Ames Transonic Wind Tunnel following the modernization of the Unitary Plan Wind Tunnel at the PT,ts. = corrected test section total pressure at the model test section . Subsonic Mach number control involves setting the compressor drive speed to.begin with the commonly used standards for the definition of uncertainty are A common example from practice is the incorrect zeroing of an instrument .. method recommended by the authors of Ref. .. 1 Wind

Tunnel Testing Part 1: Management Volume, AIAA Recommended Practice Rmorphing wing system description, its actuation system structure, the control Controller design, morphing wing, actuator modeling, wind tunnel tests, Proc IMechE Part G: J Aerospace Engineering. , Vol. (1) . best configuration of the morphed airfoil shape. The .. In: 30th AIAA applied aerodynamics.polycarbonate to that of a standard machined steel model. Testing covered used in wind tunnel testing for initial baseline aerodynamic database development.