NORTH ATLANTIC TREATY ORGANISATION

RESEARCH AND TECHNOLOGY ORGANISATION

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RTO TECHNICAL REPORT **TR-AVT-136**

Assessment of Aerothermodynamic Flight Prediction Tools through Ground and Flight Experimentation

(Evaluation des outils aérothermodynamiques de prédiction de vol par l'expérimentation au sol et en vol)

This Report Documents the Efforts of Task Group AVT-136.

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- IST Information Systems Technology Panel
- NMSG NATO Modelling and Simulation Group
- SAS System Analysis and Studies Panel
- SCI Systems Concepts and Integration Panel
- SET Sensors and Electronics Technology Panel

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14. Abstract

AVT-136 was organized to assess and improve the understanding and prediction of aerothermodynamic phenomena and aerothermal loads for space transportation and earth/planetary entry systems through ground and flight experimentation. To achieve this goal, efforts were organized around six scientific topic areas: 1) Nose and Leading Edges; 2) Shock Interactions and Control Surfaces; 3) Shock Layers and Radiation; 4) Boundary Layer Transition; 5) Gas-Surface Interactions; and 6) Base and Afterbody Flows. Although it was recognized from the onset of AVT-136 activities that reliance on flight research data yet to be collected posed significant risk to the achievement of Task Group objectives, the group concluded the significant benefit to be derived from comparison of computational simulations with flight data warranted pursuit of such a program of work. Unfortunately, program delays and failures in the flight programs contributing to the AVT-136 effort prevented access to flight research data. Despite this setback, most of the scientific topic areas developed by the Task Group made significant progress in the assessment of current capabilities. Additionally, the activities of AVT-136 generated substantial interest within the international scientific research community and the work of the Task Group was prominently featured in a total of six invited sessions dedicated to AVT-136 in the Sixth European Symposium on Aerothermodynamics for Space Vehicles and the 48th (2010) AIAA Aerospace Sciences Meeting.

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