

NORTH ATLANTIC TREATY ORGANIZATION



RESEARCH AND TECHNOLOGY ORGANIZATION

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RTO LECTURE SERIES 221

Technologies for Future Precision Strike Missile Systems

(les Technologies des futurs systèmes de missiles pour
frappe de précision)

The material in this publication was assembled to support a Lecture Series under the sponsorship of the Systems Concepts and Integration Panel (SCI) and the Consultant and Exchange Programme of RTO presented on 23-24 March 2000 in Atlanta, USA, on 3-4 April 2000 in Turin, Italy, and on 6-7 April 2000 in Ankara, Turkey.



Published September 2000

Distribution and Availability on Back Cover

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The Research and Technology Organization (RTO) of NATO

RTO is the single focus in NATO for Defence Research and Technology activities. Its mission is to conduct and promote cooperative research and information exchange. The objective is to support the development and effective use of national defence research and technology and to meet the military needs of the Alliance, to maintain a technological lead, and to provide advice to NATO and national decision makers. The RTO performs its mission with the support of an extensive network of national experts. It also ensures effective coordination with other NATO bodies involved in R&T activities.

RTO reports both to the Military Committee of NATO and to the Conference of National Armament Directors. It comprises a Research and Technology Board (RTB) as the highest level of national representation and the Research and Technology Agency (RTA), a dedicated staff with its headquarters in Neuilly, near Paris, France. In order to facilitate contacts with the military users and other NATO activities, a small part of the RTA staff is located in NATO Headquarters in Brussels. The Brussels staff also coordinates RTO's cooperation with nations in Middle and Eastern Europe, to which RTO attaches particular importance especially as working together in the field of research is one of the more promising areas of initial cooperation.

The total spectrum of R&T activities is covered by 7 Panels, dealing with:

- SAS Studies, Analysis and Simulation
- SCI Systems Concepts and Integration
- SET Sensors and Electronics Technology
- IST Information Systems Technology
- AVT Applied Vehicle Technology
- HFM Human Factors and Medicine
- MSG Modelling and Simulation

These Panels are made up of national representatives as well as generally recognised 'world class' scientists. The Panels also provide a communication link to military users and other NATO bodies. RTO's scientific and technological work is carried out by Technical Teams, created for specific activities and with a specific duration. Such Technical Teams can organise workshops, symposia, field trials, lecture series and training courses. An important function of these Technical Teams is to ensure the continuity of the expert networks.

RTO builds upon earlier cooperation in defence research and technology as set-up under the Advisory Group for Aerospace Research and Development (AGARD) and the Defence Research Group (DRG). AGARD and the DRG share common roots in that they were both established at the initiative of Dr Theodore von Kármán, a leading aerospace scientist, who early on recognised the importance of scientific support for the Allied Armed Forces. RTO is capitalising on these common roots in order to provide the Alliance and the NATO nations with a strong scientific and technological basis that will guarantee a solid base for the future.

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Published September 2000

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ISBN 92-837-1037-1



*Printed by St. Joseph Ottawa/Hull
(A St. Joseph Corporation Company)
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Technologies for Future Precision Strike Missile Systems

(RTO EN-13)

Executive Summary

This report documents the results of NATO Research and Technology Organization (RTO) lecture series number 221, entitled “Technologies for Future Precision Strike Missile Systems.” The primary purpose of the lecture series was the disseminating of state-of-the-art scientific and technical knowledge among a wide audience. The lecture series director and two other speakers provided lecturers.

Emerging technologies for precision strike missile systems that were addressed in the lecture series included:

- Missile aeromechanics technologies. Assessments included hypersonic airframes, low cost/high temperature structure, and ramjet propulsion.
- Guidance & control technologies. Assessments included precision navigation using light weight/low cost GPS/INS and optimal guidance laws.
- Seeker technologies. Assessments included active and passive infrared and millimeter wave seekers.
- Missile design technologies. Assessments included computer programs and electronic spreadsheets for conceptual design.
- Missile/aircraft integration technologies. Assessments included high firepower weapon concepts, reduced observables, and insensitive munitions.
- Simulation/validation technologies. Assessments included hardware-in-the-loop and design validation.
- Automatic target recognition. Assessments included robust algorithms and hardware/algorithm optimization.

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les Technologies des futurs systèmes de missiles pour frappe de précision

(RTO EN-13)

Synthèse

Ce rapport présente les résultats du Cycle de conférences No. 221 sur « Les technologies des futurs systèmes de missiles pour frappe de précision » organisé par l'Organisation pour la recherche et la technologie de l'OTAN (RTO). Ce cycle de conférences a eu pour objectif principal la diffusion, auprès d'un public travaillant dans un grand éventail de domaines, de connaissances scientifiques et techniques de pointe. Les communications ont été fournies par le Directeur du cycle de conférences et deux autres conférenciers.

Les technologies naissantes suivantes, relatives aux systèmes de missiles pour frappe de précision, ont été abordées

- les technologies de l'aéromécanique des missiles avec une évaluation des cellules hypersoniques, des structures à coût modéré, résistant aux hautes températures, et de la propulsion par statoréacteur.
- les technologies du guidage et du pilotage avec une évaluation de la navigation de précision à l'aide d'équipements GPS/INS légers et à coût modique et de lois de guidage optimisées.
- les technologies des autodirecteurs, avec une évaluation des autodirecteurs actifs et passifs à ondes millimétriques et infrarouge.
- les technologies de l'aéromécanique des missiles avec une évaluation des programmes informatiques d'étude de définition et des tableurs.
- les technologies d'intégration missile/aéronef avec une évaluation des concepts des armements à grande puissance de feu, la furtivité et les munitions à risques atténués.
- les technologies de simulation/validation avec une évaluation du matériel dans la boucle et de la validation de la conception.
- les technologies de la reconnaissance automatique de la cible avec une évaluation de l'optimisation du matériel par rapport aux algorithmes et des algorithmes robustes.

Cette publication a été rédigée pour servir de support de cours pour le Cycle de conférences 221, organisé par la Commission RTO sur les (SCI) dans le cadre du programme des consultants et des échanges de la RTO du 23-24 mars 2000, à Atlanta, Etats-Unis et du 3-4 avril 2000 à Turin, Italie, et du 6-7 avril 2000 à Ankara, Turquie.

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REPORT DOCUMENTATION PAGE																														
1. Recipient's Reference	2. Originator's References RTO-EN-13 AC/323(SCI)TP/25	3. Further Reference ISBN 92-837-1037-1	4. Security Classification of Document UNCLASSIFIED/ UNLIMITED																											
5. Originator	Research and Technology Organization North Atlantic Treaty Organization BP 25, 7 rue Ancelle, F-92201 Neuilly-sur-Seine Cedex, France																													
6. Title	Technologies for Future Precision Strike Missile Systems																													
7. Presented at/sponsored by	the Systems Concepts and Integration Panel (SCI) and the Consultant and Exchange Programme of RTO in support of a Lecture Series presented on 23-24 March 2000 in Atlanta, USA, on 3-4 April 2000 in Turin, Italy, and on 6-7 April 2000 in Ankara, Turkey.																													
8. Author(s)/Editor(s) Multiple			9. Date September 2000																											
10. Author's/Editor's Address Multiple			11. Pages 96																											
12. Distribution Statement	There are no restrictions on the distribution of this document. Information about the availability of this and other RTO unclassified publications is given on the back cover.																													
13. Keywords/Descriptors	<table border="0"> <tbody> <tr> <td>Precision guided munitions</td> <td>Global positioning system</td> <td>Submunitions</td> </tr> <tr> <td>Missiles</td> <td>Inertial navigation</td> <td>Computerized simulation</td> </tr> <tr> <td>Mission profiles</td> <td>Homing devices</td> <td>Integrated systems</td> </tr> <tr> <td>Military planning</td> <td>Millimeter waves</td> <td>Target recognition</td> </tr> <tr> <td>Data links</td> <td>Synthetic aperture radar</td> <td>Precision strike</td> </tr> <tr> <td>Aerodynamics</td> <td>Design</td> <td>Technology assessment</td> </tr> <tr> <td>Missile airframes</td> <td>Warheads</td> <td>Infrared seekers</td> </tr> <tr> <td>Missile guidance</td> <td>Kinetic energy</td> <td>Smart weapons</td> </tr> <tr> <td>Missile control</td> <td></td> <td></td> </tr> </tbody> </table>			Precision guided munitions	Global positioning system	Submunitions	Missiles	Inertial navigation	Computerized simulation	Mission profiles	Homing devices	Integrated systems	Military planning	Millimeter waves	Target recognition	Data links	Synthetic aperture radar	Precision strike	Aerodynamics	Design	Technology assessment	Missile airframes	Warheads	Infrared seekers	Missile guidance	Kinetic energy	Smart weapons	Missile control		
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publié par le National Technical Information Service
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(accessible également en mode interactif dans la base de
données bibliographiques en ligne du NTIS, et sur CD-ROM)



Imprimé par St-Joseph Ottawa/Hull
(Membre de la Corporation St-Joseph)

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