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Applied Vehicle Technology Panel
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Preliminary Meeting Announcement and Invitation to Contribute Papers

Symposium

on

Computational Uncertainty
Incertitude de calcul

Organised by the Members of the

APPLIED VEHICLE TECHNOLOGY PANEL (AVT)

AVT-147 Programme Committee

to be held
1 to 4 of October 2007
in
Athens, Greece

Contributions and participation are invited from NATO and Partner for Peace (PfP)* Nations only

Note: Final date for submission of abstracts is 1 December 2006
(See Page 6 for details)

*** Full list of PfP Nations – Attachment 4**

GENERAL SCOPE OF THE MEETING

The Applied Vehicle Technology Panel (AVT) of the Research and Technology Organisation (RTO) of NATO is organising a meeting on "Computational Uncertainty". The meeting is open to NATO and PfP Nations. The expectation of this meeting is to increase awareness of the problems and possible solutions connected with computational uncertainty associated with high fidelity physics and engineering modelling and simulation, through in-depth presentations and discussions among researchers, academicians, and engineers of the topics 1 through 5 given on the next page.

The meeting will focus on recent and current research and development related to air, land, and sea platforms. Papers from any of the commercial, government or academic sources that address one of the five topics are welcome. Promotion and marketing papers, which do not include technical details, difficulties, and results, are discouraged**.**

Background

The increasing complexity of modern air, land, and sea systems, as well as the increasing cost and difficulty associated with the traditional method of experimentally verifying system and subsystem design and integration makes the use of high fidelity, physics-based simulation an attractive alternative or adjunct for system design and development. The predictive ability of such simulations such as computational fluid dynamics (CFD) and computational structural mechanics (CSM) have matured significantly. However, for numerical simulations to be used with confidence in design and development, measures of uncertainty must be available to assess the quality of these simulations. Development of such measures has only recently started. In order to fully leverage the potential of numerical simulations, producers and users of computationally obtained information must be aware of issues associated with quantifying the inherent uncertainties. This symposium has been established to compile state-of-the art methods of assessing computational uncertainty, to identify issues associated with these methods and their implementation, as well as to present examples of how these issues are being addressed and how the methods are being applied.

Aim and Scope

Papers are being solicited that address uncertainty estimation associated with high fidelity, physics- and engineering-based simulations. The solicitation includes papers that identify sources of error and uncertainty in numerical simulation from either the industry perspective or from the disciplinary or cross-disciplinary perspective. Examples of the industry perspective include how computational uncertainty methods are used to reduce system risk in various stages of design or development. Examples of the disciplinary and cross-disciplinary perspective include how uncertainties are identified and quantified. It is planned to include survey papers which identify key issues and which provide an overview of the current state of the art in computational uncertainty estimation.

Authors are encouraged to submit papers on the following five topics:

Topic 1: Identification of computational uncertainty sources and their quantification:
This topic covers identification of computational uncertainty sources, their quantification, and their ranking with respect to the design and development process. Papers are solicited from both the industry and disciplinary perspectives.

Topic 2: Numerical Accuracy
This topic includes but is not limited to grid effects (e.g., cell skewness, size, and orientation, grid refinement), numerical error estimation (e.g., adjoint methods), solution convergence, higher order methods (e.g., how these methods are affected by grid quality, error estimation, etc.), time accuracy, and effects of geometry approximation.

Topic 3: Code Verification
This topic includes methods for code verification such as the method of manufactured solutions and other methods. Issues associated with the development and application of verification methods and procedures are of interest.

Topic 4: Code Validation
This topic includes issues associated with how much validation is practical for a given level of fidelity for a particular purpose (i.e., design, development, or modification of an existing system). Papers are solicited dealing with the selection and use of standard validation suites which include collections of data sets that span all or part of the range of complexity from unit problems, components and sub-systems to complete systems. Also, included in this topic are requirements for validation data sets that address new experimental challenges such as new types and methods of measurement and new data reduction techniques, measurement accuracy, model form errors (e.g., prediction errors resulting from use of specific type of turbulence model), and methods for geometry validation (e.g., as built and as tested geometry of wind tunnel models).

Topic 5: Uncertainty Propagation Methods
This topic covers methods that can be used to combine uncertainties from various sources to provide estimates of total simulation uncertainty. Such methods include but are not limited to root sum square of component sources, sensitivity analysis, polynomial chaos, stochastic methods such as Monte Carlo, design of experiments, statistical and probabilistic methods applied to unsteady, periodic and non-periodic phenomena, and methods to combine computational and computational uncertainty.

Papers, which include any one or a combination of these topics, are encouraged, as well as papers addressing relevant experience in practical applications which demonstrate how computational uncertainty affects design and development decisions. Full proceedings will be published on CD. Invited and summary papers covering these topics will be solicited from recognized experts.

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PROCEDURES

Security Level and Clearance for Presentation

The Symposium is unclassified and open to NATO and PfP countries. Please note that papers from Russia are particularly welcome. Distribution of papers will be NATO/PfP Unclassified.

It is the responsibility of each contributor to fulfil the publication release requirements of his/her organisation/company and country and to obtain clearance of abstracts and papers as needed. An

official clearance is mandatory in the United Kingdom and the United States and there may also be a requirement in other countries to obtain clearance for unclassified as well as classified papers. For further information, authors should consult the appropriate Programme Committee Member listed in this document or their National RTO Co-ordinator (Attachment 3).

Invitation and Format of Abstracts

The Programme Committee invites scientists and engineers of the NATO Alliance to submit abstracts of papers to be considered. The abstract should describe (in a minimum of one to a maximum of two pages), the aim, results and conclusions of the work. Inclusion of 1 to 2 figures and/or photographs to support the abstract is encouraged. **All abstracts should be submitted by e-mail to the Technical Chairman identified**.

The abstract must also contain a declaration from the author(s) that there are no restrictions regarding presentation neither during the symposium nor of the publication of the paper (as described in the abstract) in the Meeting Proceedings. Authors' names, complete mailing addresses and other requested information must be included with the abstracts. Please use the Abstract Submittal Form (Attachment 1) and keep the size of files less than 1 MB.

Deadlines and Schedule

29 May 2006	Distribution of Call for Papers
1 December 2006	Deadline for submission of abstracts
1 March 2006	Authors informed by Programme Committee of selection decision and RTA will then dispatch authors' package
15 June 2007	Submission of final US papers to US National Co-ordinator (special instructions will be issued with author's package)
15 July 2007	Deadline for the submission of final papers to RTA
1-4 October 2007	RTO AVT-147 Symposium in Athens, Greece

Paper Preparation and Procedure

The Programme Committee will notify authors of papers selected for presentation and publication. RTA/AVT Executive Office will then send detailed instructions concerning preparation of manuscripts to lead authors. Questions related to technical aspects of the program or the papers should be addressed to the Program Technical Chairman as indicated above. Questions of an administrative nature should be addressed to the AVT Panel Office:

RTA/AVT Panel Executive Office
Attn Sandra Cheyne
7, rue Ancelle
92200 Neuilly sur Seine, France
Tel. 33 1 55 61 22 87, Fax: 33 1 55 61 98
email: cheynes@rta.nato.int

The special procedure for paper submittal by UK and US authors will be explained in the authors' package**.**

Attachment 1

AVT ABSTRACT SUBMISSION FORM

SUBJECT:

Computational Uncertainty

TITLE OF PAPER
(TITRE DE l'EXPOSE) _____

_____

Note à l'attention des auteurs français: veuillez indiquer le titre de votre expsosé en français et éventuellement en anglais.

Authors/co-authors listed in the order they will appear on final manuscript with forenames or initials, and titles, e.g. Dr., Prof., etc.
Noms des auteurs/co-auteurs dans l'ordre ou ils apparaîtront sur le manuscrit définitif, avec prénoms ou initiales et les titres, par exemple, Dr., Prof., etc.

1**. Title** **Name** **Nationality**

_____

Affiliation: _____

Full Mailing Address:

_____

_____

_____

Tel/fax/email: _____

2. Title **Name** **Nationality**

_____

Affiliation: _____

Full Mailing Address:

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Tel/fax/email: _____

3. Title **Name** **Nationality**

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Affiliation: _____

Full Mailing Address:

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Tel/fax/email: _____

4. Title **Name** **Nationality**

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Affiliation: _____

Full Mailing Address:

_____

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Tel/fax/email: _____

It will be possible to present the paper at the Symposium and to have it published as NATO/PfP Unclassified.

Name of submitting author and date of submission

_____

Attachment: Abstract

Attachment 2

NATO's Research & Technology Organisation (RTO)

RTO is the single focus in NATO for Defence Research and Technology activities. Its mission is to conduct and promote co-operative 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 co-ordination 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 co-ordinates RTO's co-operation 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 co-operation.

Seven bodies cover the total spectrum of R&T activities. These bodies are dealing with:

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

These bodies are made up of national representatives as well as internationally recognised experts of high technical stature. The bodies also provide a communication link to military users and other NATO bodies. Technical Teams created for specific activities and with a specific duration carry out RTO's scientific and technological work. 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 co-operation 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.

The mission of the Applied Vehicle Technology Panel (AVT) is to improve the performance, affordability and safety of vehicle platforms, propulsion and power systems through the advancement of appropriate technologies. The Panel addresses technology issues related to vehicle platforms, propulsion and power systems operating in all environments, including land, sea, air and space, for both new and ageing systems.

Attachment 3

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