

# DYMAT News

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Dear colleagues,

Following the General Assembly at Dijon, in September, the Board members did me the honour of appointing me as President of the DYMAT Association. It is a heavy responsibility in regard to which I undertake to do my best. In 1983, I was a member of the first DYMAT Governing Board, and I know the works done since that time, under the guidance of the successive Presidents. 24 years later, DYMAT still exists, the DYMAT 2006 Conference was very successful, and I am grateful to José Cirne for the job achieved during these last three years.

Now, we have to carry on our effort to improve the image of the association and to do it in such a way that it will be more and more involved in the international scientific network. We must also offer new services to the members of DYMAT.

Of course, we will continue with the organization of Technical Meetings (see page 4 concerning the forthcoming Cambridge meeting) and International Conference every three years (the next is planned at Brussels in September 2009). However, a lot of other actions have to be increased or developed, that I cannot relate in detail in this paper. Roughly, they concern 4 main themes which are:

- **communication**, by the use of modern and efficient media to inform on the activities of the association and to make it better known,
- **education**, by the organization of short professional training courses and specific events for students involved in the field of dynamic behaviour of materials,
- **relations**, by strengthening our links with other scientific associations, by promoting the subgroups activities, by developing new contacts,
- **attractivity**, especially by a voluntarist policy towards the industrialists who don't seem now to find in DYMAT the answer to their expectations.

We intend to publish 3 or 4 DYMAT News a year, so you will be steadily informed on the progress of these works.

Masses of things must be done, but I know that I can rely on the motivation and the creativity of each board member to succeed in, also on the ideas of **each member of the association**: your opinion is of great importance and you have to play a chief part. DYMAT must be first and foremost **your** association: don't hesitate to send us your comments, your proposals, your information (like thesis, workshops etc...) to be included in this paper!

Sincerely yours,  
**Richard Dorneval**

## ■ DYMAT INTERNATIONAL CONFERENCE – Dijon (France), Sept. 11-15, 2006



From the opinions received during and after the conference, it seems that DYMAT 2006, held at Dijon on September, was a success, with 230 participants coming from 23 countries! 80 oral presentations and 120 posters allowed the building of a solid technical programme with a rather good scientific level.

DYMAT 2006 gave the opportunity to take stock of the different fields in which efforts are spent. It demonstrated that the studies of

dynamic behaviour of materials are still very active around the world.

Of course, improvements can be effected, particularly in the selection of papers, to avoid a repeated duplication of works and to bring out the main field of research to be investigated in the future. However, the DYMAT International Conference still appears to be an efficient meeting point to encourage specialist exchanges and labs collaborations. In 2009, the Brussels conference will keep these objectives: Gunther Dyckmans, the chairman, is now working to make it successful again!

### DYMAT Association

CEA Centre de Valduc – 21120 Is-sur-Tille (France)  
<http://www.dymat.org> – e-mail : [enquiries@dymat.org](mailto:enquiries@dymat.org)



## → LIFE of the ASSOCIATION

### ■ MINUTES of the GENERAL ASSEMBLY – Dijon (France), Sept. 14<sup>th</sup>, 2006

#### 1. President's report.

José Cirne said this was his last talk as president. Newsletters have recently kept the members up to date. The eighth conference has been a great success as have been the technical meetings in Metz and Brussels. Subgroups have been supported. Eight members of the Governing Board will be elected today. He hopes the next president will have all the same support he has received. He asked Bradley Dodd and Phillippe Viot to report on the subgroups they head up after the vote on the President's report.

#### 2. Vote to accept the President's report.

The President's report was accepted by the Assembly with no objections.

Bradley Dodd then reported on the Light Weight Armour Group (LWAG). It has existed since about 2001. He was asked to form it by the Federation of European Materials Societies (FEMS) and Prof. Degeischer of the Vienna Technical University. Money was available to set it up. Initially it met too frequently. Now we have annual workshops. There were 45 participants in Bordeaux last Friday.

Phillippe Viot reported on the Crashworthiness group. It has met once. The second meeting will be held in one month in Bordeaux. 35 presentations will be made from academic as well as industrial researchers.

#### 3. Treasurer's report.

André Lichtenberger presented a summary of the accounts of the DYMAT Association for the period between August 2 2005 and July 27 2006. These have been audited and approved by François Buy.

#### 4. Vote to accept the Treasurer's report

The Treasurer's report was accepted by the Assembly with no objections.

Two people asked the Treasurer whether graduate students could in future be subsidised to attend the meeting.

#### 5. Election of the Board

The following people stood for election: Nadia Bahlouli (new candidate), Hervé Couque, Gunther Dyckmans, Veli-Tapani Kuokkala (new candidate), Erhardt Lach, Fabrice Llorca, Clive Siviour (new candidate), Alexis Rusinek, Ramon Zaera. Professors Klepaczko and El-Magd were chosen by the assembly as tellers.

56 valid and 1 invalid votes were received. A. Rusinek received the minimum of votes and therefore was not re-elected.

The **DYMAT Governing Board** for 2006/7 is presented in the next paragraph.

#### 6. Miscellaneous

Philip Church and William Proud asked about making credit card payments to DYMAT. André Lichtenberger said it costs 4-5% per transfer with a credit card. Bradley Dodd said the cost for online credit card payments was small. William Proud agreed on the basis of his experience with the Association of High Speed Photography and Photonics. Online credit card systems charge a fixed annual amount, not a charge per item. André Lichtenberger said he would look into this matter again in time for the 2009 conference.

### ■ DYMAT GOVERNING BOARD 2006/2007

(President) Richard DORMEVAL	Commissariat à l'Energie Atomique – Valduc (France)
(Vice-President) Gunther DYCKMANS	Royal Military Academy – Brussels (Belgium)
(Treasurer) André LICHTENBERGER	Institut Franco-Allemand de Recherches de Saint-Louis (retired) (France)
(Secretary) Stephen M. WALLEY	University of Cambridge (United-Kingdom)
Nadia BAHLOULI	Université Louis Pasteur – Strasbourg (France)
José Maria CIRNE	Universidade de Coimbra – Coimbra (Portugal)
Hervé COUQUE	Nexter – Bourges (France)
Bradley DODD	University of Oxford (retired) (United-Kingdom)
Gérard GARY	Ecole Polytechnique – Palaiseau (France)
Veli-Tapani KUOKKALA	Tampere University of Technology (Finland)
Erhardt LACH	Institut Franco-Allemand de Recherches de Saint-Louis (Germany)
Fabrice LLORCA	Commissariat à l'Energie Atomique – Valduc (France)
Hugh MAC GILLIVRAY	Imperial College of London (United-Kingdom)
Clive R.SIVIOUR	University of Oxford (United-Kingdom)
Phillippe VIOT	Ecole Nationale des Arts et Métiers – Bordeaux (France)
Ramon ZAERA	Universidad Carlos III de Madrid (Spain)

#### ■ NEW TECHNICAL ADDRESS :

#### DYMAT Association

CEA Centre de Valduc – 21120 Is-sur-Tille (France)

<http://www.dymat.org>    [enquiries@dymat.org](mailto:enquiries@dymat.org)

## → THESIS and BOOKS

## ■ DYMAT 2006 THESIS AWARD

Since Toledo in 1997, the DYMAT Association kept the tradition to awarding a prize for the **best PhD thesis** in the field of the mechanical behaviour of materials at high strain-rates. For the DYMAT 2006 Conference, 10 candidates sent in an extended abstract (four pages) of their thesis in English. A number of criteria for objectively assessing the work was drawn up covering aspects such as academic rigour as well as industrial usefulness. On this basis, the Selection Committee then debated the merits of the candidates before deciding to award the thesis prize for 2006 to

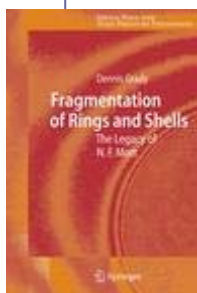
**Nuno Ricardo Maia Peixinho** of Portugal,  
for his thesis entitled

“Study of viscoplasticity models for the prevision of mechanical behaviour of high-strength steels subjected to impact”.



What the Board particularly liked about this work was the application and checking of a wide range of constitutive models to an industrial problem. Other outcomes of this process for the future include giving more guidance to candidates as to what constitutes a good extended abstract, and the publication of the assessment criteria. Now, Nuno Peixinho is Professor of the Portuguese Universidade do Minho (Guimarães). Congratulations.

## ■ NEW



■ The present book surveys the theoretical analysis put forth by Mott with particular focus on his efforts to characterize the size and distribution of fragments resulting from a dynamic fragmentation event. Copies of the original internal reports of Mott and his co-workers are included. The book also pursues additional theoretical analysis with the intent of delving further into the physical ideas and unfinished analysis implicit in Mott's original studies. This book will be of interest to all

scientists and engineers concerned with the dynamic fracture and fragmentation of solid bodies subject to intense transient loads imparted by explosive detonation and high-velocity impact from both the historical and modern perspective.

### Fragmentation of Rings and Shells

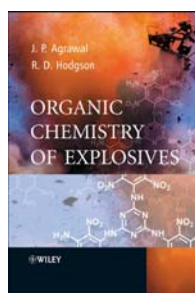
The Legacy of N.F. Mott

by **Dennis Grady**

Series: Shock Wave and High Pressure Phenomena

Springer 2006 – [www.springer.com](http://www.springer.com)

■ This is the first text that brings together the essential methods and routes used for the synthesis of organic explosives in a single volume. Assuming no prior knowledge, the book discusses everything from the simplest mixed acid nitration of toluene, to the complex synthesis of highly energetic caged nitro compounds.



### Organic Chemistry of Explosives

by **Jai Prakash Agrawal & Robert Hodgson**

December 2006

John Wiley & Sons Ltd - [www.wileyurope.com](http://www.wileyurope.com)

## ■ RECENT THESES

**H. Czerski** – “Ignition of HMX and RDX”,  
Cambridge University (UK), 2006

**H.J. Prentice** – “Development of stereoscopic speckle photography techniques for studies of dynamic plate deformation”,  
Cambridge University (UK), 2006

**D.M. Williamson** – “Deformation and fracture of a polymer bonded explosive and its simulants”, Cambridge University (UK), 2006

**C. Czarnota** – “Ductile damage of metallic materials under dynamic loadings – Application to spalling” (in French)  
Metz University (F), 2006

## ■ BOOK INFORMATION

**Proceedings of the 2nd International Conference On High-Speed Forming.**

Publ. University of Dortmund, Germany (2006).

ISBN 3-00-018432-5

**Proceedings of the 9th Seminar in New Trends in Research of Energetic Materials.**

Publ. University of Pardubice, Czech Republic (2006).

**Proceedings of the 8th International Symposium on Rock Fragmentation by Blasting**

Publ. Editec S.A., Santiago, Chile (2006). ISBN 154.408

**Multifunctional Energetic Materials**

ed. N.N. Thadhani et al., Publ. Materials Research Society, Warrendale, PA (2006)

**Proceedings of the 8th International Conference on Mechanical and Physical Behaviour of Materials under Dynamic Loading – DYMAT 2006**

DYMAT Association, France (2006)

→ CONFERENCES and WORKSHOPS

■ INTERNATIONAL CONFERENCES

✓ "Workshop on Modeling Concrete under High-Impulsive Loadings"  
AUSTIN (USA) – March 20-21, 2007  
[www.ahpcrc.org/conferences/concwks](http://www.ahpcrc.org/conferences/concwks)

✓ "10<sup>th</sup> Int. Seminar on New Trends in Research of Energetic Materials"  
PARDUBICE, (Czech Rep.) – April 25-27, 2007  
[www.ntrem.co](http://www.ntrem.co)

✓ **PLASTICITY 2007**  
"13<sup>th</sup> International Symposium on Plasticity"  
Alyeska Prince Hotel, ALASKA (USA) – June 2-6, 2007  
[www.neat-plasticity.com](http://www.neat-plasticity.com)

✓ "SEM Annual Conference on Experimental and Applied Mechanics"  
SPRINGFIELD (USA) – June 3-6 2007  
[www.sem.org](http://www.sem.org)

✓ "Multi-phases and multi-components materials under dynamic loading"  
KAZIMIER DOLNY (Poland) – June 11-14, 2007  
[www.lmt.ens-cachan.fr/emmc10](http://www.lmt.ens-cachan.fr/emmc10)

✓ "APS Shock Compression of Condensed Matter"  
HAWAII (USA) – June 23-29, 2007  
[www.apshawaii07.com](http://www.apshawaii07.com)

✓ **ICEM 13**  
"International Conference on Experimental Mechanics"  
ALEXANDROUPOLIS (Greece) – July 1-6, 2007  
[www.icem13.gr](http://www.icem13.gr)

✓ "21<sup>st</sup> International Colloquium on the Dynamics of Explosions and Reactive Systems"  
POITIERS (France) – July 23-27, 2007  
[www.icders2007-poitiers.org](http://www.icders2007-poitiers.org)

✓ **IMPLAST'07**  
"9<sup>th</sup> International Symposium on Plasticity and Impact Mechanics"  
BOCHUM (Germany) – August 21-24, 2007  
[www.tm.bi.rub.de/implast07](http://www.tm.bi.rub.de/implast07)

✓ **DYMAT - 17<sup>th</sup> Technical Meeting (see below)**  
"The High Rate Mechanical Properties of Energetic Materials, their Binders or Simulants"  
CAMBRIDGE (UK) – September 6-7, 2007  
[www.dymat.org](http://www.dymat.org)

✓ **ATEM' 07**  
"International Conference on Advanced Technology in Experimental Mechanics 2007"  
FUKUOKA (Japan) – September 12-14, 2007  
[www.congre.co.jp/atem07/](http://www.congre.co.jp/atem07/)

✓ "Sixth Int. Symp. on Impact Engineering"  
DAEJON (Korea) – September 16- 19, 2007  
[www.isie2007.org](http://www.isie2007.org)

✓ **HVIS**  
"Hypervelocity Impact Symposium"  
WILLIAMSBURG (USA) – September 23-27, 2007  
[www.hvis.org](http://www.hvis.org)

✓ **HSIMP**  
"High Speed Industrial Manufacturing Processes"  
SENLIS (France) – November 13 -15, 2007  
[www.hsimp.com](http://www.hsimp.com)

✓ Workshop on "Constitutive relations and numerical simulation of industrial dynamic processes"  
METZ (France) – November 2007  
[rusinek@lpmm.sciences.univ-metz.fr](mailto:rusinek@lpmm.sciences.univ-metz.fr)

✓ "6<sup>th</sup> International Conference on Mechanics of Time-Dependent Materials"  
MONTEREY (USA) – March 30 - April 1, 2008  
[www.ae.utexas.edu/MTDM08/](http://www.ae.utexas.edu/MTDM08/)

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■ **17<sup>th</sup> DYMAT TECHNICAL MEETING**  
Cavendish Laboratory, Cambridge (UK) – September 6-7, 2007

The goal of the **17<sup>th</sup> DYMAT Technical Meeting** is to present and discuss recent progress in the study of the dynamic behaviour of energetic materials leading to the development of constitutive relations which can be used in Finite Element Codes in order to model these materials in the uses to which they are put. The conference will cover theoretical, experimental & numerical approaches to the mechanical behaviour of energetic materials and simulants at high strain rates.

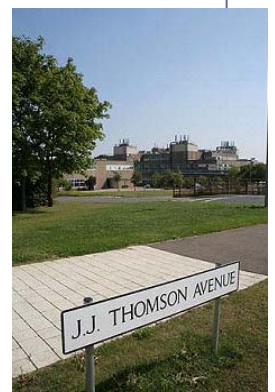


The topics of interest include:

- Constitutive relations
- Dynamic failure
- Novel experimental techniques
- Numerical simulations

Organizer: **Dr. S.M. Walley**  
DYMAT Technical Meeting 2007  
Cavendish Laboratory - J.J. Thomson Avenue  
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## → DYMAT SUBGROUPS

## ■ LWAG WORKSHOP

The 4<sup>th</sup> **Light Weight Armour Group** Workshop was held in the University of Bordeaux at the "Centre de Recherche Paul Pascal", on the 8th of September 2006. Its title was: "New Materials and Light Armour".

The Workshop was supported by the CNRS, Region Aquitaine, Arkema, Giat Industries and Saint-Gobain. About 50 people attended, a significant number coming from industry. Many of the participants were continuing onto the Dymat International Conference in Dijon.

A flavour of the Workshop is best given by listing a few papers:

- Reaction Bonded Boron Carbide-Based for Lightweight Armour Applications, by Y. Yeshurun (Rafael, Haifa)
- Armoured Vehicles, Current Status and Future Trends, by E. Petitpas (Giat Industries, France)
- Carbon Fibre Composites and Kevlar Textiles - High Speed Photography and Material Response, by W. Proud, Cavendish Laboratory, Cambridge, UK.
- Some Observations on the Dependence of Ceramic Mass Efficiency on the Properties of the Backing Material, by Y. Ashuach (Rafael, Haifa)
- Mechanical Behaviour of Highly Porous Titanium Under Dynamic Loading, by E. Lach (ISL France).

Because of a significant change in the responsibilities of Erhardt Lach at ISL, it has been decided recently to appoint Francois Barthelemy<sup>1</sup> as the new Chairman. Filipe Teixeira-Dias<sup>2</sup> is the Vice Chairman and Steve Walley<sup>3</sup> is the Secretary.

The LWAG website is: <http://lwag.web.ua.pt/> and our e-journal can be found at: <http://lwag.web.ua.pt/e-journal.html>.

The next LWAG Workshop will probably be on the 28<sup>th</sup> September 2007 in France, and it is hoped that it will be associated with Saint-Gobain.

All members feel it is vital for the LWAG to attract industrial interest.

Because we have had a number of Israeli researchers at most of our meetings, the LWAG committee have decided to hold a Workshop in Israel, perhaps in 2008.

**Bradley Dodd**  
[brad@thincweb.com](mailto:brad@thincweb.com)

**Gilles Roy**  
[gilles.roy@cea.fr](mailto:gilles.roy@cea.fr)

<sup>1</sup> [francois.barthelemy@dga.defense.gouv.fr](mailto:francois.barthelemy@dga.defense.gouv.fr)

<sup>2</sup> [ftd@mec.ua.pt](mailto:ftd@mec.ua.pt)

<sup>3</sup> [smw14@cam.ac.uk](mailto:smw14@cam.ac.uk)

## ■ MECADYMAT

7<sup>th</sup> Annual topical meeting of the **MECADYMAT** subgroup :  
"Damage and fracture of materials under dynamic loading"  
November 16th – 17<sup>th</sup> 2006

**Dijon (France)**

The 7th annual topical meeting of the MECADYMAT entity, subgroup of the Association Française de Mécanique (French Association on Mechanics) animated by researchers from MECAMAT and DYMAT associations, took place as part of the "MATERIAUX 2006" National Conference in November 2006.

The workshop was organized by F. Llorca and G. Roy (Dymat), F. Hild (Mecamat) and A. Thionnet (Amac).

Three invited lectures (Pr. A. Dragon/LMPM-ENSMA Poitiers, Pr. A. Molinari/LPMM-Metz University and Dr. J. Renard/Centre des Matériaux- Mines de Paris), thirteen keynote lectures and four posters have been presented, with an attendance of thirty to sixty people, a usual value for this meeting.

Topics of concern were formulation, identification and use in computer codes of constitutive models for dynamic damage and fracture of materials (metals, polymers, composites, ceramics, soils) in the context of high energy impacts, crashes, and dynamically developing instabilities at various length scales. Both industrial and academic researches were represented, highlighting both the difficulties in developing efficient bridges between the two communities for dynamic applications (often slowed down by the weak panel of available numerical tools for industrial applications). Very elegant and fruitful work was presented, especially concerning dynamic instabilities: prediction of necking under high rate expansion of shells, thermomechanical modelling of adiabatic shearing effects at large and small scales for impact and machining issues respectively, but also concerning successful coupling of high-speed correlated imaging and unusual numerical methods development for the modelling of crack initiation and propagation at various length scales in polymers.

Exchange between speakers and attendance was sustained at a high level during the whole colloquia thanks to the time period let for discussion and the wanted informal context of the meeting. Next topical meeting should be held in early 2008 in western France.

→ LABS

by **Nadia Bahlouli**  
[bahlouli@imfs.u-strasbg.fr](mailto:bahlouli@imfs.u-strasbg.fr)

Every year, some DYMAT members move, and because of that, news labs enter our association. It is for this reason that we think it would be interesting to present these labs in DYMAT News.

So, we invite any DYMAT member concerned, whatever the country, to send us by e-mail a short paper describing their lab and the field of activities. We will be happy to publish it.

■ **DO YOU KNOW THE “IMFS Labs”?**

The **Institute of Fluid and Solid Mechanics** is one of the sixty two research units at the University Louis Pasteur (ULP), Strasbourg (France). This institute is sponsored by both the CNRS and ULP as a Mixed Research Unit (UMR 7507 CNRS/ULP).

IMFS houses two research groups. One is the area of Fluids and Environments and one is the area of Materials and Biomechanics. It is composed of about 40 permanent researchers, 20 technicians and 40 PhD students.

The research themes conducted at IMFS are:

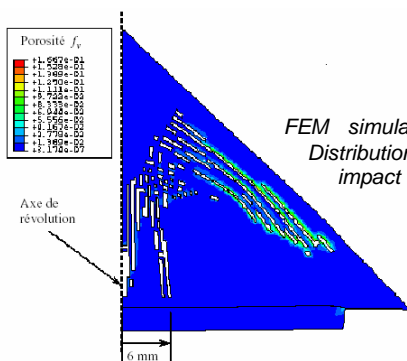
■ **Group 1: Materials and Biomechanics**

**Leader : S. Ahzi** ([ahzi@imfs.u-strasbg.fr](mailto:ahzi@imfs.u-strasbg.fr))

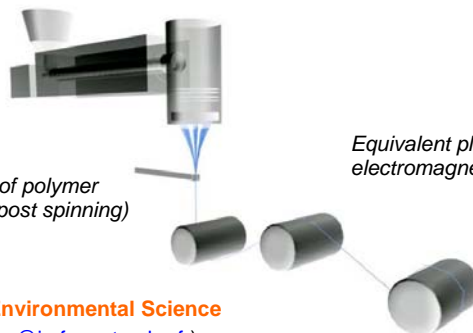
- Development of constitutive equations for material behavior
- Microstructure/properties relationships
- Micromechanical modeling
- Materials behavior under extreme conditions
- Numerical simulation of material and processing
- Biomechanical Systems



Split Hopkinson Pressure Bar at IMFS



FEM simulation of planar test for a steel HY-100.  
 Distribution of the damage at 3.60  $\mu$ s after the impact (300 m/s)



Simulation of polymer post drawing (post spinning)

Equivalent plastic strain in electromagnetic forming of sheets (high strain rate process)

■ **Group 2: Fluid Mechanics and Environmental Science**

**Leader : P. Ackerer** ([ackerer@imfs.u-strasbg.fr](mailto:ackerer@imfs.u-strasbg.fr))

- Newtonian fluids and particle transport
- Non Simulation of Instabilities, turbulences
- Flow and Transport in Heterogeneous Porous Media - Hydrology

■ **Interdisciplinary Research Groups**

**French-German Environmental Sciences Institute**

- Metrology and Measurement Systems
- Mathematical Tools: Homogenization, Inverse Problems
- Numerical Methods

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Director : **Y. Rémond** ([remond@imfs.u-strasbg.fr](mailto:remond@imfs.u-strasbg.fr))