

# DYMAT News

p. 2 Life of the Association

p. 4 Theses and Books

p. 5 Conferences - Workshops

p. 6 Labs

Dear colleagues,

The General Assembly held in Bourges on September 12th gave the opportunity for the presentation of the Board's activities during the last year. They are detailed in the minutes reported in this issue of DYMAT News.

First, on behalf the Association, I am very grateful to Nexter Munitions for hosting the 18th Technical Meeting and I thank Dr. Hervé Couque and his colleagues for having accepted the task of organizing it. This meeting was really perfect. It was the first time that the mechanical behaviour of nanomaterials was approached in a DYMAT-TM, and it was very satisfactory to note that many laboratories are nevertheless involved in these fields of research, with a high scientific level illustrated by the various speakers.

Secondly, I thank the DYMAT members who attended the General Assembly or sent a proxy for accepting the President and Treasurer's reports without one dissenting voice, thus to renew their confidence in the Board.

The possibility of providing financial support to scientific events was put in practice at the beginning of 2008. This offer was very successful, with 5 workshops supported by DYMAT. Of course, we will carry on this action in 2009.

Moreover, with the aim of strengthening and enlarging links with other countries active in the field of the dynamic behaviour of materials, inside and outside Europe, the DYMAT Governing Board decided to set up a network of DYMAT Official Correspondents (DOC). Several well-known scientists with international reputations agreed to play this role in their country. Some agreements were given recently and until now this network has not really worked. Our objective for the next year will be to increase this correspondent network and to propose an efficient way of working for the promotion of our Association.

Lastly, the Board is actively preparing the DYMAT 2009 International Conference. We have received a large number of abstracts (approximately 330), and we hope that you will all be able to come to Brussels in September.

As the end of this year is drawing close, I take the opportunity of this report to wish you and your family a Merry Christmas and Happy New Year

Sincerely yours,  
Richard Dormeval

## ■ 18<sup>th</sup> DYMAT TECHNICAL MEETING

The 18<sup>th</sup> DYMAT technical meeting, hosted by Nexter Munitions, was held at Bourges on September 10-12, 2008 on the theme: "The Behaviour of Bulk Nanomaterials and Metallic Glasses under Dynamic Loading".

The symposium was very successful with 72 participants from 12 countries covering theoretical, experimental and numerical approaches of these newly developed materials. After an overview on the industrial and environmental issues of nanomaterials, recent advances on mechanical



behaviour of nanomaterials were presented through 16 presentations covering metallic, ceramic, nanocomposite nanostructured materials and carbon nanotube fibers. Insights of the deformation and the failure through shear banding of metallic glasses were provided through 8 presentations. These presentations were summarized in proceedings, which can be order through the web site of the DYMAT association <http://www.dymat.org>.

The technical meeting ended with a visit to the show room and high strain rate facilities of Nexter Munitions.



### DYMAT Association

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→ LIFE OF THE ASSOCIATION

■ MINUTES of the GENERAL ASSEMBLY – Bourges (France), Sept. 12, 2008

Opening the General Assembly, Richard Dorneval first thanked Hervé Couque and his colleagues for organizing the Technical Meeting and the General Assembly.

He then announced the death of Janusz Klepaczko of the LPPM, Metz. He was very active in the field of dynamics and techniques. His career since 1960 had taken him from Poland to Canada, the USA, and France. He was a faithful member and friend of DYMAT.

**1. President's report**

The main activities of the Board during the last year included seeking to improve the image of the Association.

**1.1. Financial support.**

In this way, the Association provided financial support for workshops on topics relevant to the Association. Five workshops had been supported:

- the first in by end of the last year for the organization of an international workshop held at Metz (France) on 'Constitutive Relations and Numerical Simulation of Industrial Dynamic Processes'
- then for an international conference organized in May at Rocamadour (France) on 'Materials under extreme loadings with application to penetration and impact',
- again for a workshop in September at Poznan (Poland) on 'Dynamic fracture and damage of brittle materials and its industrial applications',
- a meeting of the Light Weight Armour Group in October at Rijswijk (Netherlands)
- last, for the annual MecaDymat Meeting which was hosted at Lorient, in France, by the University of South Britain. The Association enjoys excellent relations with Mecamat.

The aims of providing financial support to workshops and conferences are: (i) the promotion of the Association; (ii) to enhance the reputation of the Association; and (iii) to attract new members and contacts.

**1.2. DYMAT Correspondents**

A new idea has been pursued this year, namely the setting up of a network of official correspondents. At present, the Board consists of 16 members from a variety of European countries. We also have two longstanding American correspondents: Marc Meyers and Rusty Gray. We are seeking to expand this network both within and outside Europe. The responsibilities of these correspondents will be: (i) to promote DYMAT in their country/region; (ii) to encourage new members; and (iii) to inform DYMAT (mainly through the newsletter) about events in their country/region. Letters were sent out in July to prospective

candidates. 5 positive replies have been received from Professors Magnus Langseth (NORWAY), Ezio Cadoni (SWITZERLAND-ITALY), Daniel Rittel (ISRAEL), Hidetoshi Kobayashil (JAPAN) and Trevor Cloete (SOUTH AFRICA). Three other positive answers are awaited from CANADA, NETHERLANDS and CHINA.

**1.3. Other business.**

Richard Dorneval reminded the Assembly that revised statutes were passed last year at an Extraordinary General Assembly. We now need new internal rules. These will be presented for approval at the next ordinary General Assembly.

The new website is now working. DYMAT News is being published regularly. He asked the members present to send information for inclusion.

The subgroups continue to be active. It has been proposed that a future Technical Meeting should be on the theme of one of the subgroups.

The next International Congress will be held in Brussels September 7-11 2009. The deadline for abstracts is October 31 2008.

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

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

**3. Treasurer's report**

André Lichtenberger presented the finances of the Association for the period July 27, 2007 to July 16, 2008. These have been audited by François Buy, a non-Governing Board member of DYMAT. This report shows that during the period covered, a small loss occurred, but this is an artefact of the reporting period.

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

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

**5. Election of the Board**

The following people stood for election: Nadia Bahlouli, Hervé Couque, Gunther Dyckmans, Veli-Tapani Kuokkala, Erhardt Lach, Fabrice Llorca, Clive Siviour, Ramon Zaera. There were therefore 8 candidates for 8 places. The assembly chose the following as tellers: William Proud, Philippe Viot. 40 valid votes were cast. There were no rejections. All 8 candidates were therefore re-elected.

**DYMAT Governing Board for 2008/9:** see page 3. President, vice-President, Treasurer and Secretary were elected by the board during the meeting held on Sept. 12.



➔ LIFE OF THE ASSOCIATION

■ DYMAT GOVERNING BOARD 2008/2009

**President**

Richard DORMEVAL (France)

**Vice-President**

Gunther DYCKMANS (Belgium)

**Treasurer**

André LICHTENBERGER (France)

**Secretary**

Stephen M. WALLY (UK)

Nadia BAHLOULI (France)

José Maria CIRNE (Portugal)

Hervé COUQUE (France)

Bradley DODD (UK)

Gérard GARY (France)

Veli-Tapani KUOKKALA (Finland)

Erhardt LACH (Germany)

Fabrice LLORCA (France)

William G. PROUD (UK)

Clive R. SIVIOUR (UK)

Philippe VIOT (France)

Ramon ZAERA (Spain)

■ WITH SADNESS

Janusz R. Klepaczko was born in February 27th, 1935 in Warsaw and passed away in Metz on August 15, 2008. He graduated from Warsaw University of Technology in 1959, he began his research work in 1960 at the Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland, where he worked until 1984. Since 1985 Janusz R. Klepaczko was a CNRS Research Director in the professor category at the Laboratory of Physics and Mechanics of Materials from Paul Verlaine University of Metz, France.



Janusz was very active in the field of dynamic behaviour of materials and experimental techniques, shared between Poland, Canada, USA and France. He has authored or co-authored over 200 papers and reports and he was editor of three books in the area of fracture dynamics and constitutive equations in dynamic plasticity. Janusz was also a member of the Editorial Board of International Journal of Impact Engineering.

Janusz R. Klepaczko was a faithful member of DYMAT since the birth of the Association, always active in congresses and meetings. We lost a great scientist but also a loyal companion and a friend. Our thoughts are very much with his colleagues and his family.

**A workshop in memory of Janusz R. Klepaczko will be held at the ENIM Engineering School at Metz Campus, on May 13-15, 2009.**

For further information, please contact [ludmann@enim.fr](mailto:ludmann@enim.fr).

■ LWAG 2009 CONFERENCE

**Security and use of innovative technologies against terrorism.**

**AVEIRO (Portugal) – May 18-19, 2009**

The Light Weight Armour Group for Defence and Security started about 8 years ago in Coimbra (Portugal) as a sub-group of DYMAT. In global terms, the subjects of the LWAG are the study of all modern body and vehicle armour and also the study of armour systems as a whole. There have been large developments in both types of armour in recent years and we hope to understand these changes and improve upon them. LWAG is



interested in all armour materials such as ceramics, all plastics materials such as polyamides and woven materials, metal matrix composites (MMC), ceramic matrix composites

(CMC), metallic foams and other porous materials. It is hoped that via workshops, LWAG can help improve on the design of armour and armour systems as well as explore the use of computer codes, where applicable. It was decided many years ago that the meetings should be informal workshops where there would be formal papers but also time for discussion. We are confident that this conference at Aveiro will be as successful and as interesting as previous workshops.

The purpose of the conference is to present new developments in the context of security and armour systems. The provisional list of topics is as follows: armour systems and materials; defense systems; impact energy dissipation and absorption; blast-wave absorption; ballistic and impact phenomena; innovative technologies against terrorism; impact and terminal ballistics; body and vehicle protection; counter-terrorism; safety engineering; applications and case studies; numerical simulation; modelling and theoretical studies; experimental methods; testing and standardization. For a complete and more detailed list of topics please check the LWAG 2009 Conference web page. It is also a major purpose of the conference to facilitate the communication between specialists interested in fields related to security and armour systems.



→ BOOKS, THESES AND OTHER

■ BOOK INFORMATION

■ Antiterrorism and Homeland Defense

Polymers and Materials

edited by

**John G. Reynolds**, Lawrence Livermore National Lab.

**Glenn E. Lawson**, Naval Surface Warfare Center

Series: American Chemical Society Publication n° 980

Since 9/11/2001, there has been a dramatic increase in research activity for anti-terrorism and homeland defense. Much of this research activity has been in the detection and mitigation of chemical, biological, and nuclear (CBN) materials related to explosives and weapons of mass destruction. New detection systems are necessary because current technology is not sufficient in warning of the presence of such weapons. New mitigation methods are necessary for protecting military and civilian personnel from attack, as well as securing facilities from contamination. The key to any detection system and mitigation method is to find a way to specifically and selectively identify the target, such as a nerve agent of a biological pathogen, and then design materials to protect, deter, or decontaminate the target. New materials in the form of polymers and other types have played an important role in advancing the field. Development of new materials has led to more specific chemical detectors, such as surface acoustic wave and ion mobility devices for detection of nerve agents and explosives.

This symposium book presents several chapters that address the development of these new materials.

■ Materials in sports equipment (Volume 2)

by **Aleksandar Subic**, RMIT University, Australia

Woodhead Publishing Limited

<http://www.woodheadpublishing.com>

The first volume of Materials in sports equipment has become an essential reference describing improvements in materials technology and their impact on equipment in a range of sports. This second volume combines coverage of recent developments in advanced materials and their application in a number of sports not covered in Volume one.

Part one discusses general issues such as modelling of materials behaviour in sports equipment, non-destructive testing methods, materials and design for sports apparel and mouth and skull protection. Part two analyses the materials and design of equipment used for specific sports: baseball, snowboarding, ice hockey, fly fishing, archery and rowing. The book also reviews design and materials in athletics and fitness equipment.

This book will be a unique and essential reference to all materials scientists and sports equipment designers and manufacturers developing products in this rapidly evolving field.



■ MATLAB Codes for Finite Element Analysis

by **A. J. M.Ferreira**

Series: Solid Mechanics and Its Applications, Vol. 157

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

This book illustrates how MATLAB compact and powerful programming framework can be very useful in the finite element analysis of solids and structures. The book shortly introduces finite element concepts and an extensive list of MATLAB codes for readers to use and modify. The book areas range from very simple springs and bars to more complex beams and plates in static bending, free vibrations and buckling problems.

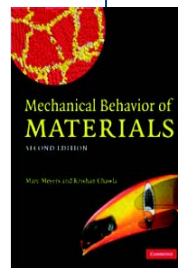


■ Mechanical Behavior of Materials (2nd Edition)

by **Marc André Meyers**, University of California, San Diego, and **Krishan Kumar Chawla**, University of Alabama, Birmingham

<http://www.cambridge.org/catalogue>

A balanced mechanics-materials approach and coverage of the latest developments in biomaterials and electronic materials, the new edition of this popular text is the most thorough and modern book available for upper-level undergraduate courses on the mechanical behavior of materials. To ensure that the student gains a thorough understanding the authors present the fundamental mechanisms that operate at micro- and nano-meter level across a wide-range of materials, in a way that is mathematically simple and requires no extensive knowledge of materials. This integrated approach provides a conceptual presentation that shows how the microstructure of a material controls its mechanical behavior, and this is reinforced through extensive use of micrographs and illustrations. New worked examples and exercises help the student test their understanding.



■ THESES

**Loïc Signor**

(contact: [loic\\_signor@yahoo.fr](mailto:loic_signor@yahoo.fr))

"Contribution towards the characterization and modelling of micro-spalling in shock-melted tin"

ENSMA - Ecole Nationale Supérieure de Mécanique et d'Aéronautique de Poitiers (France), Jul. 2008

**David Grégoire**

(contact: [alain.combescure@insa-lyon.fr](mailto:alain.combescure@insa-lyon.fr))

"On the initiation, the growth, the arrest and the restart of cracks under impact loading"

INSA – Institut National des Sciences Appliquées de Lyon (France), Oct. 2008

*Thesis abstracts available on [www.dymat.org](http://www.dymat.org)*

→ WORKSHOPS AND CONFERENCES

■ CONFERENCES\*

✓ **Plasticity 2009**

International Symposium on Plasticity and Current Applications  
Special Session on "Strain Rate Effects in Polymers"  
ST. THOMAS (Virgin Islands, USA) – January 3-8, 2009  
<http://www.internationalplasticity.com/indexST2.html>

✓ **International Conference on Bioengineering & Biomaterials**  
MEKNES (Morocco) – March 18-20, 2009  
<http://ic2b2009.enise.fr>

✓ **MECADYMAT 2009**

BOURGES (France) – April 1-2, 2009  
<http://www2.ensi-bourges.fr/mecadymat09/>

✓ **Composites 2009**

2<sup>nd</sup> ECCOMAS Thematic Conference on the Mechanical Response of Composites  
LONDON (UK) – April 1-3, 2009  
[www.imperial.ac.uk/aeronautics/composites2009](http://www.imperial.ac.uk/aeronautics/composites2009)

✓ **MATERIAiS 2009**

Fifth International Materials Symposium  
LISBON (Portugal) – April 5-9, 2009  
<http://www.demat.ist.utl.pt/materiais2009/>

✓ **In memory of Prof. J.R. Klepaczko**

Workshop on Dynamic Behaviour of Materials  
METZ (France) – May 13-15, 2009  
Contact: [ludmann@enim.fr](mailto:ludmann@enim.fr)

✓ **LWAG 2009 Conference**

Security and use of innovative technologies against terrorism  
AVEIRO (Portugal) – May 18-19, 2009  
[www.lightarmour.org](http://www.lightarmour.org)

✓ **WORKSHOP 2009 on Theoretical and Experimental**

Approaches for Dynamic Industrial Processes  
MADRID, LEGANÉS (Spain) – June 24-26, 2009  
[workshop2009@uc3m.es](mailto:workshop2009@uc3m.es)

■ **MECADYMAT09**

BOURGES (FRANCE) – APRIL 1-2

Each year, a French workshop called "MecaDymat" is organized jointly by DYMAT and MECAMAT Associations. In 2008, this workshop took place in Lorient: it was organized by our colleagues from "Université de Bretagne Sud". A short report was included in the last DYMAT News n° 34 (July 2008).

The 2009 MecaDymat Workshop will be organized at Bourges by Patrice Bailly and his team from "Ecole Nationale Supérieure d'Ingénieurs" (ENSIB). Notice that the MECAMAT and DYMAT representatives are respectively

- **Hervé Trumel** ([hervé.trumel@cea.fr](mailto:hervé.trumel@cea.fr))
- **Sébastien Mercier** ([mercier@lpmm.univ-metz.fr](mailto:mercier@lpmm.univ-metz.fr))

Information and pre-registration form available on  
<http://www2.ensi-bourges.fr/mecadymat09/>

✓ **APS – SCCM**

Topical Conference on Shock Compression of Condensed Matter  
Nashville, Tennessee (USA) – June 28-July 3, 2009  
Contacts: [wgp1000@cam.ac.uk](mailto:wgp1000@cam.ac.uk), [mdfurni@sandia.gov](mailto:mdfurni@sandia.gov) or [wvanderson@lanl.gov](mailto:wvanderson@lanl.gov)

✓ **ISSW 27**

27<sup>th</sup> International Symposium on Shock Waves  
ST-PETERSBURG (Russia) – Jul. 19-24, 2009  
<http://www.ioffe.ru/ISSW27/>

✓ **19<sup>ème</sup> Congrès Français de Mécanique**

MARSEILLE (France) – August 24-28, 2009  
<http://www.cfm2009.cnrs-mrs.fr/>

✓ **1<sup>st</sup> International Conference on Material Modelling**

DORTMUND (Germany) – Sept. 15-17, 2009  
[www.icmm1.de](http://www.icmm1.de)

✓ **FRAGBLAST9**

9<sup>th</sup> International Symposium on Rock Fragmentation and Blasting  
GRANADA (Spain) – Sept. 13-17, 2009  
<http://www.fragblast.org/>

✓ **DYMAT 2009**

9<sup>th</sup> International Conference on the Mechanical and Physical behaviour of Materials under Dynamic Loading  
BRUSSELS (Belgium) – September 7-11, 2009  
[www.dymat2009.org](http://www.dymat2009.org)

✓ **3<sup>rd</sup> ICPB**

Third International Conference on Polymer Behavior  
MARRAKECH (Morocco) – Nov. 3 -7, 2009  
<http://www-imfs.u-strasbg.fr/colloques/ICPB3/>

✓ **PACAM XI**

11<sup>th</sup> Pan-American Congress of Applied Mechanics  
FOZ DO IGUAÇU, Paraná (Brazil) – Jan. 4-8, 2010  
<http://www.set.eesc.usp.br/pacam2010/>

*\* in red letters are new announcements with respect to the last DYMAT News*

■ **DYMAT 2009 INTERNATIONAL CONFERENCE**

BRUSSELS (BEGIUM) – SEPTEMBER 7-11, 2009

On November 14th, the Organizing Committee had received 330 abstracts coming from 32 different countries! It's a real record if we consider that for the last conference at Dijon, which was very successful, we reached (only) 235 propositions! The job will be hard for the Selection Committee!

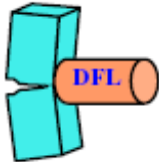
Remember the following schedule:

01 Jan 2009	Start of registration
<b>31 Jan 2009</b>	<b>Papers due</b>
30 Jun 2009	End early registration
31 Aug 2009	End of registration
07 Sep 2009	Start of conference

[www.dymat2009.org](http://www.dymat2009.org)  
[dymat2009@rma.ac.be](mailto:dymat2009@rma.ac.be)

■ THE "DYNAMIC FRACTURE LABORATORY" of the FACULTY OF MECHANICAL ENGINEERING, TECHNION, HAIFA, ISRAEL

by Daniel Rittel  
contact: [merittel@technion.ac.il](mailto:merittel@technion.ac.il)



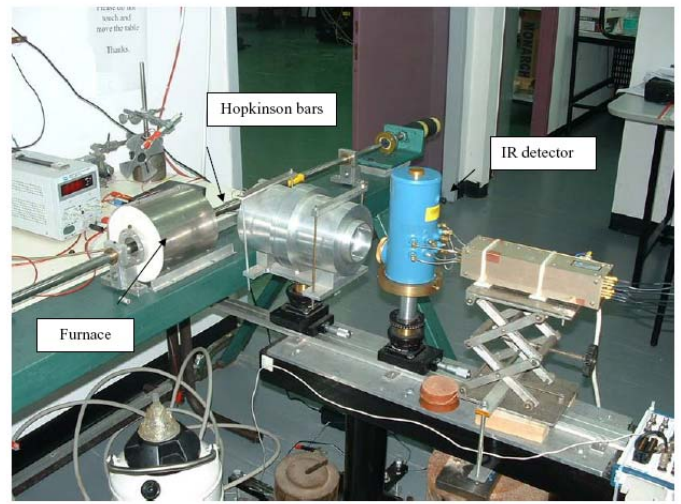
Established in 1994, the Dynamic Fracture Laboratory is the dynamic branch of the Materials Mechanics Center (Head, D. Rittel), comprising state of the art Split Hopkinson Pressure Bars of various materials, for dynamic compression and tension testing.

Our bars range in diameter from 4 mm to 26 mm. The achievable strain rates range from for cylindrical or recently developed shear compression specimens,

from room temperature to about  $T=900^{\circ}\text{C}$ . A variety of techniques have been developed to apply confinement to the investigated materials (metals, polymers, concrete). Real time temperature monitoring is achieved thanks to a dedicated array of infrared detectors. A Cordin high speed digital camera is also available (200.000 fps – 16 pictures).

The failure analysis and fractographic characterization are carried out on our JEOL scanning electron microscope.

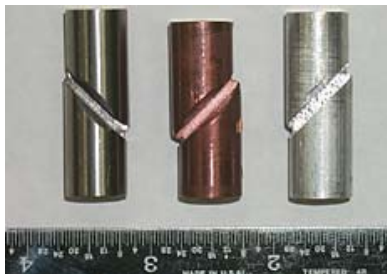
The experimental activity is coupled to intensive numerical modelling (Dr. A. Dorogoy), based on home made algorithms as well as commercial codes (ANSYS, LS-DYNA and ABAQUS).



C300 19 mm Maraging steel split Hopkinson bars with the IR detection system and furnace

Some topics of interest

- Dynamic fragmentation and fracture
- Dynamic mechanical behaviour of materials
- Influence of confinement on dynamic performance and ballistic resistance of polymers
- Adiabatic shear failure



- Tungsten heavy alloys
- Scaling issues in close-range blast situation
- Armor performance of material systems
- Numerical modeling of dynamic deformation and failure
- Dynamic rheological properties of earth magma