

ANNOUNCEMENT

Two Intensive Workshops

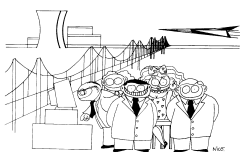
1. Special Approach to Inelastic Analysis of Structures

and

2. Intelligent Optimal Design Of Complex Systems

November 3-4 and 6-7, 2008

*TO GIVE AN OPTIMAL SOLUTION TO YOUR
PROBLEMS EVEN WHEN YOU KNOW THAT
YOU DO NOT KNOW THE WHOLE SOLUTION*



CADLM
9 Rue Raoul Dautry
91190 Gif Sur Yvette, France

INTENSIVE WORKSHOP1: November 3-4, 2008, Gif Sur Yvette

SPECIAL APPROACH TO INELASTIC ANALYSIS OF STRUCTURES

THE AIM OF THE WORKSHOP1:

The designers of structural systems have to take into account the inelastic behavior of their materials, involving work-hardening and creep. For this, the classical mathematical theory of plasticity has been used over the past several decades. Many contributors have helped to provide correct formulations and useful tools to solve technologically important problems. Such formulations are usually given in terms of rates or increments of the field quantities with unilateral constraints, and require long and expensive computer calculations.

This special approach is based on the introduction of a change of variable, leading to an efficient method to calculate bounds on the response of the structure. The method can be implemented using only *quasi-static elastic analysis*, even for dynamic loadings or contact loadings of the structure. The method dramatically decreases the amount of time required for the complex inelastic analysis, even during dynamic loadings, such as seismic or contact-rolling loadings. The purpose of this intensive WORKSHOP1 is to show how it is possible to transform the classical formulations to make them much clearer, leading to easier and more direct solution of the problems. The participants will be provided with a thorough grounding in this new approach. This will be achieved through a balance of lectures, demonstrations and discussions of problems of the participants own interest.

WHO SHOULD ATTEND THE WORKSHOP1?:

The intensive two day workshop1 is dedicated to mechanical and civil engineers and researchers who have to think about the design of structures subjected to elevated temperatures and high pressures. It is recommended that they have some knowledge of numerical analysis of elastic structures and the classical plasticity in order to appreciate the advantages of this new framework. Practical exercises and writing of softwares will allow the participants to quickly master the principles of this approach. Moreover, applications to life prediction in fatigue, in the modeling of shot-peening, rolling and in the seismic analysis will be considered in order to show the exceptional potential of the new approach for solving practical problems. The participants will have the opportunity to present their own problems and to receive comments from the other participants and the instructors of the workshop1.

WORKSHOP1 CONTENT:

Nowadays, engineers have to use plasticity in the design of their structures subjected to elevated temperatures and high pressures.

The inelastic analysis of structures involves two essential steps:

- i) the constitutive modeling of materials, based on continuum mechanics, leading to local equations;
- ii) the numerical treatment of structures made of such materials, involving solution of the global associated boundary values problems.

In continuum modeling of materials, at least two approaches are possible:

- i) A MACROMECHANICAL phenomenological approach, where global mathematical expressions and functions are guessed and co-efficients are determined by fitting some experimental data;
- ii) A MICROMECHANICAL physical approach where several known local micromechanical processes are incorporated into the analysis.

The objective of the modeling is to provide conditions under which hardening (i.e. increase of the elastic limit), worksoftening (i.e. decrease of the elastic limit), creep (i.e. viscous effects), and many other classes of material behavior, have to be considered.

Having selected a particular local modeling, it is then necessary to consider the response of the structure for any given initial state and loading path.

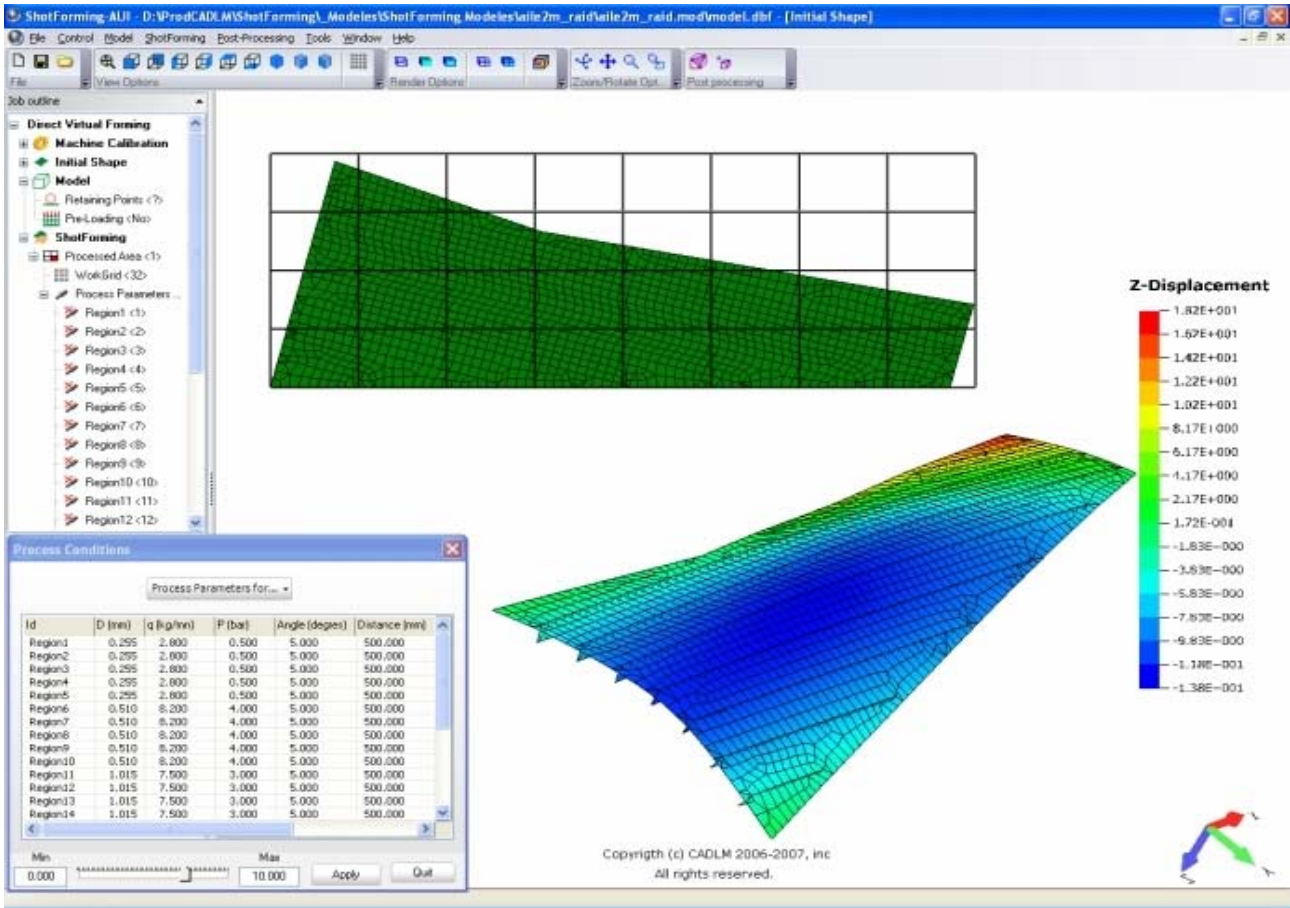
Generally, this study can only be made numerically using computers to solve complex differential equations. Several programs are presently available. Various numerical schemes have been developed; they are usually based on the finite element method equipped with sophisticated time integration algorithms involving very long and expensive incremental and step-by-step computations. This is even more obvious when the loading is cyclic or dynamic and when an assessment of the limiting response of the system is required.

In this WORKSHOP1, it is shown how it is possible to modify and integrate these two steps in order to make them much clearer and hence to allow for an easier and more direct solution of the problems.

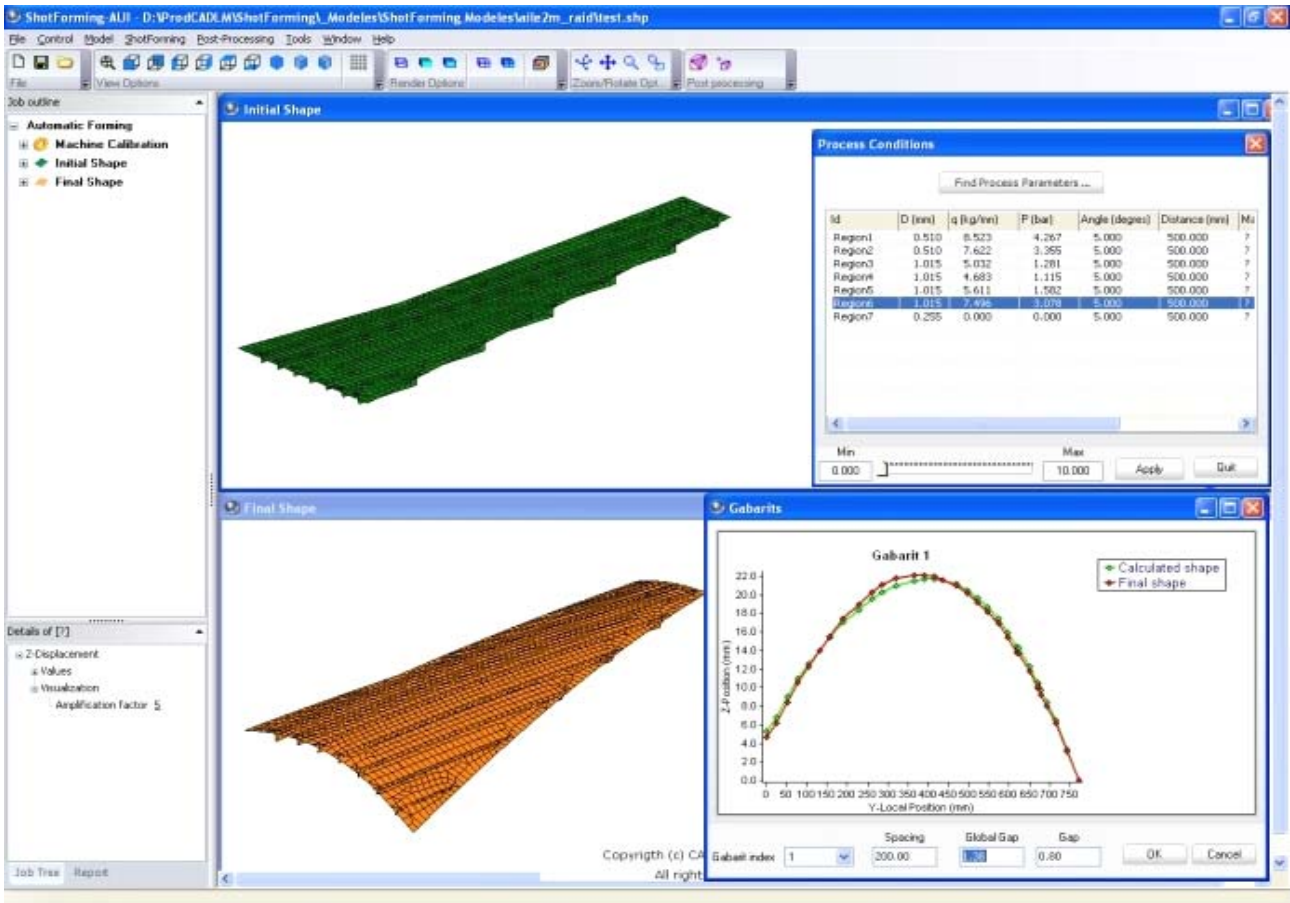
In this approach, every step is SIMPLE, PRACTICAL, and may be easily used in conjunction with the classical tools such as any elastic finite element code. Indeed, only simple elastic calculations are made with "cleverly" chosen loadings and elastic constants which allow a drastic reduction of the time of computation by a factor from 10 to 10000 and almost infinite in the case of contact loadings such as shot peening !!

The participants will receive a copy of the book *A New Approach in Inelastic Analysis of Structures* and many of the FORTRAN subroutines which are useful to integrate the approach using any good elastic program.

If you need any more information regarding the workshop1 content, please contact the workshop coordinator.



AUTOMATIC METAL FORMING OF HUGE PANELS WITH SHOT PEENING
How to control several hundred of thousands of impacts with balls?



INTENSIVE WORKSHOP2: November 6-7, 2008, Gif Sur Yvette

ADVANCED INTELLIGENT DESIGN OF STRUCTURES

THE AIM OF THE WORKSHOP2:

The designers of materials and structures are often compelled to make decisions under uncertain conditions, seeking solutions to problems which do not have known solutions. These include constitutive modeling, fatigue life prediction, wear, friction, or prediction of errors of inelastic analysis of structures.

This workshop2 will provide, with the help of explicit examples, the bases and the use of a new approach to deal with such design problems using the available expert knowledge, experimental data and computational tools. It is based on coupling the existing knowledge of experts, numerical results, and experimental data, with special automatic learning and optimization techniques.

The workshop2 first reviews some basic issues relating to materials and structures, as well as Symbolic-Numerical Automatic Learning, and Optimization Schemes. Then, according to the needs of the participants, examples of applications to optimization of processes and formulation of material input, direct coupling with CAD Systems, optimal design of structures for random or cyclic loading, control of processes, and non-destructive tests.

The participants will be provided with a thorough grounding in this new approach. This will be achieved through a balance of lectures, demonstrations, and discussion of their own problems.

WHO SHOULD ATTEND THE WORKSHOP2?:

The intensive 2 day-workshop2 is dedicated to Mechanical and Civil Engineers and Researchers who have to design structures subjected to any kind of loading such as elevated temperatures and high pressures, dynamic loads in CRASH, rolling and wear, etc. Practical exercises, training on special examples will allow the participants to assimilate the principles of this approach. Moreover, explicit applications to time-life prediction in fatigue-corrosion, to materials processes, to modeling of materials and direct link to CAD systems will be made to show the exceptional potentials of the new approach for the Mechanical Engineering, the Civil Engineering, Automotive, and the Aeronautical Industries. The participants will have an opportunity to present their own problems on posters and to listen to the advises of the audience and the instructors of the workshop.

WORKSHOP2 CONTENT:

For this approach, it is necessary:

- i) to build a DATABASE of examples, i.e., to obtain some experimental, an real or simulated results, where the EXPERTS indicate all variables or descriptors which are essential to the considered problem. This is, at first, done with some PRIMITIVE descriptors x which are usually of a limited number. Then, the data are transformed into INTELLIGENT descriptors XX of a larger number, using the existing knowledge (usually insufficient) and theories. These descriptors may be numbers, Boolean or alphanumeric, names of files which give access to data bases, or curves, signals, and images. The results or conclusions may be classes (good, not good, ...) or numbers;
- ii) to generate the RULES using any Automatic Learning Tool. Each conclusion is explained as function (or set of rules) of some of the input intelligent descriptors, together with a known reliability or accuracy measure; and
- iii) to optimize at two levels (the Inverse Problem).

* considering the intelligent descriptors as independent, it is possible to get the OPTIMAL SOLUTION satisfying the special required properties and allowing the DISCOVERY OF NEW MECHANISMS,

* considering the intelligent descriptors linked to primitive descriptors, it is possible to obtain the optimal solution which is technologically possible. So, not only a Practical Optimal Solution is obtained, but also the experts may learn the missing parts, may build models or theories based only on the retained intelligent descriptors and guided by the structure of the rules or relationships.

The same methodology applies in other classes of problems (bio engineering, nano materials and nano technologies, medical sciences, banking ..) but the seminar will focus only on the potentials of the approach to solve problems in Automotive, Nuclear and Aeronautical Industries.

QUESTIONS:

- When can I use the entire knowledge existing in my company?
- How can I identify the inherent barriers to constitutive modeling and structural analysis?
- Where can I learn the automatic learning and optimization techniques?
- How can I obtain the real optimal design for my structures?
- Are there any successful applications already in use?
- How can I use what I learned in the workshop upon returning to my company?
- Is it useful to attend the workshop2 after the workshop1?

The workshop2 will answer these questions, and will ensure that immediately after its completion, that the participants are able to use many of the principles and the tools that you have learned in your profession

If you need any more information regarding the workshop2 content, please contact the workshop coordinator.

INTELLIGENT OPTIMAL MULTIDISCIPLINARY DESIGN OF WOVEN COMPOSITES

The screenshot displays an Excel spreadsheet with various design parameters and their optimization results. A GeneHunter dialog box is open, showing the fitness function and constraints.

Cell	Parameter	Value	Min	Max
62	ACTIVE PARAMETERS FOR THE FABRIC			
63	Porosity	1.95	1.90E+00	Max
64	grammage	215.98	180	Max
65	Txhyb1	50.58	50	Max
66	Txhyb2	49.42	18.5	Max
67	Thickness	3.08	2.8	Max
70	NUMBER OF LAYERS IN THE FABRIC (DEFAULT = 16) ?			16
72	EQUIVALENT THICKNESS FOR A 16 LAYERED FABRIC			3.077329636
75	MICROSCOPIC PARAMETERS OF THE FABRIC			
76	Ay1	1.68158947	0.5	Max
248	REQUIREMENTS			
251	Ft	51.1839318	37.8	Max
252	Fsigmat	1746.72449	867	Max
253	Fc	64.9605651	34.8	Max
254	Fsigmac	305.50701	489	Max
255	Ff	1348.35086	337.5	Max
256	Fsigmaf	4578.51284	2700	Max
257	FS13	80.848028	82	Max
258	Mass AND Price OF THE FABRIC			
259	Volbund1	2299.44	Vres1	4.97E+02
260	Volbund2	1140.27	Vres2	1.91E+02
261	VOLfib1	1801.99		
262	VOLfib2	948.78		
263	Porosity	1.95	Price_resine	2.20E+02
264	VOLTOT	3077.33	Price_fib1	1.31E+03
265			Price_fib2	4.27E+02
266	Vrestot	2.67E+02		
267	Mass_resin	2.80E+02		
268	Mass_fib1	1.75E+03		
269	Mass_fib2	1.71E+03		
272	Mass_FABRIC	3735.62	Price_FABRIC	1957.894

GeneHunter Dialog Box:

- Fitness function:** \$F\$272
- Search for:** Min
- Adjustable cells (chromosomes):** \$E\$26:\$O\$26,\$B\$27,\$B\$50,\$
- Chromosome type:** Continuous
- List of constraints:**
 - \$B\$235 <= \$F\$235 T=0 P=High
 - \$B\$254 >= \$D\$254 T=0 P=High
 - \$B\$255 <= \$F\$255 T=0 P=High
 - \$B\$255 >= \$D\$255 T=0 P=High

RECOVERY OF KNOWLEDGE IN INTELLIGENT OPTIMAL TIGHTNING OF BOLTS

The screenshot shows the SKF Hydrocam software interface for hydraulic bolt tightening. It includes a main window with a graph of pressure vs. displacement, a results table, and a detailed view of the tightening process.

SKF Hydrocam Tendeurs Hydrauliques

SKF

Evolution du serrage

N° Serrage	N°	Passé	Lot	Temps	Fh	Fh/F0	F01	F02	F03	F04
0	0	0	0	0.0	0.0	0.000	0.0	0.0	0.0	0.0

Informations

- Nombre de tendeurs : 1
- Raideur effective d'un boulon : 1350 kN/m
- Effort à 100% de la limite élastique : Fy = 201.06 kN
- Tous les boulons doivent atteindre : F0 = 100.00 kN F0/Fy = 49.74 % S0 = 20985 MPa
- Effort maximal hydraulique dans les boulons : Fmax = 130.00 kN Fmax/Fy = 64.66 % Smax = 27282 MPa

Tendeur

- Ref. Tendeur : HTS 9
- D1 (mm) : 48.00
- D2 (mm) : 35.00
- Fhmax (kN) : 90
- Sh (mm2) : 9.00

WORKSHOP1 AGENDA

Monday:

1. Review of main elements of solids mechanics and numerical analysis useful for the workshop
2. New formulation of modeling of inelastic materials
3. Exercises
Lunch, Pause, personal work
4. New formulation of global evolution of inelastic structures
5. Exercises

6. Special cyclic analysis of structures
7. Programming

COCKTAIL

Tuesday:

8. Principles of dedicated pre and post-processors to insert into any finite element code in order to use the approach
9. Programming
Lunch, Pause, personal work
10. Particular applications:
seismic analysis (dynamical loading); shot peening and rolling (contact loadings); fatigue analysis
11. Presentation of problems by the participants

Synthesis-Good-bye

WORKSHOP2 AGENDA

Thursday :

1. Review Barriers in Constitutive Modeling
2. Review Barriers in Structural Analysis
3. Exercises, Individual Work, Discussions
Lunch, Pause, personal work
4. Review of Expert Systems , machine learning and numerical machine learning, neural network
5. Review of Optimization classical and genetic algorithms
6. Exercises
7. Principles of Intelligent Optimal Design

COCKTAIL

Friday:

8. Systematic Description: Materials, Structures, Signals,
Curves, Images
9. Examples of Optimal design of Materials, Structures, Processes, Testing
Lunch, Pause, personal work
10. Exercises
11. Presentation of Problems by Participants

12. Particular Applications to Participants' Technical Problems

Synthesis-Good-bye

SEMINAR VENUE

The seminar will take place at CADLM, 9 rue Raoul Dautry, 91190 Gif Sur Yvette (France)

To get more information, use the link

<http://www.cadlm.fr/page.php?page=contactsplan>

CADLM that sponsors the workshops, is a France based engineering advisory consulting and R&D Company specializing in CAD, Material Characterization, Finite Element Simulations and Intelligent Optimal Design of Complex Systems. CADLM has organized various international seminars, courses, workshops and conferences in France, Italy, Yougoslavia, USA, Canada, China, India, Singapore, Korea ... mainly in the issues of New approach of Inelastic Analysis of Structures, Optimal Designs, Plasticity, Rupture and Fracture. CADLM is a partner in a number of european projects and has obtained several research contracts from industries. More informations, brochures and books, could be obtained from our web site

<http://www.cadlm.fr/page.php?lang=anglais>

REGISTRATION FORM

Last Name: _____ First Name: _____

Institution Name: _____ Department: _____

Address: _____

Zip Code: _____ City: _____ Country: _____

Telephone: _____ Fax: _____

Email: _____

Fields of interest: _____

PAYMENT

Industrial Participants

Before October, 1, 2008

Workshop1 **700 €** or **Workshop2** **700 €** or **Workshops1and 2** **1 200 €**

After October, 1, 2008

Workshop1 **1 000 €** or **Workshop2** **1 000 €** or **Workshops1and 2** **1 600 €**

University Participants

Before October, 1, 2008

Workshop1 **200 €** or **Workshop2** **200 €** or **Workshops1and 2** **400 €**

After October, 1, 2008

Workshop1 **400 €** or **Workshop2** **400 €** or **Workshops1and 2** **600 €**

REGISTRATION

Registrations will be taken in the order of receipt, as the workshops will accommodate a limited number of persons.

The tuition for one full two day workshop is:

700 € if received before October 1, and 1 000 € if received after.

The tuition for the two workshops is reduced to:

1 200 € if received by two months in advance, and 1 600 € if received after

A reduced fee for each workshop of 200 € is accessed for the registrants who are professors or students for a registration before October 1.

The registration fee includes the documents, all luncheons, coffee breaks and the cocktail.

Registrants who cancel one month prior to the workshop will be reimbursed the registration fee minus 100 € handling charge; cancellations more than seven days prior to the workshop will be refunded 50%.

Cancellations made after this date or "no shows" will be liable for the full registration fee.

Notes: the organizers will maintain the right to cancel the workshop in case of insufficient number of participants, or to modify slightly the program if need be.

Some fellowships will be awarded to PhD students who would be recommended by two professors and would have sent their registration file before October 1, 2008.

Payment or order of command MUST accompany registration:

Check (only payable to CADLM and drawn on a French bank),

Please send your registration form to:

Mr Alain Benchissou, CADLM, 9 rue Raoul Dautry, 91190 Gif Sur Yvette (France),

Tel: +331 69072922 Fax: + 331 69072809 Email: cadlm@cadlm.fr

Workshops Coordinator and Animators:

Dr. Joseph ZARKA



He holds a Dr. es-sciences degree from University of Paris (1968) and a Civil-Mechanical Engineering diploma from Ecole Polytechnique (1962). He is now the Scientific Director of CADLM. He was Director of Research at CNRS, Laboratoire de Mécanique des Solides, Ecole Polytechnique, France, 1964-2004. He was Professor and Chairman of the Materials-Structures Department at Ecole Nationale Supérieure des Techniques Avancées (ENSTA), 1976-1981; Associate Professor at Ecole Polytechnique, 1981-1983 ; Scientific Director of Centre Etudes Techniques des Industries Mécaniques (CETIM), 1981-1986. He was a part-time visiting scientist at the Center of Excellence for Advanced Materials at University of San Diego California

(USA) and a part-time visiting Professor at Mc Gill University (Canada). Since 1986, he has participated to the creation of some consultant companies and in 1989, he founded CADLM. He is an ASME Fellow. During his several tens years as a researcher, he was able to cover all the problems in high technology: His previous interests were in micromechanical multilevel constitutive modellings, numerical analysis of structures, new formulations and simplified analysis of inelastic structures, nondestructive tests. His current research interests are towards a new approach for Advanced Intelligent optimal Design of complex Systems, (A.I.D.S.), control of fabrication, survey of structures (that he started in 1986) i.e. into the important problems where we know that we do not know the full answer and where however an answer has to be proposed. Email: j.zarka@cadlm.fr

Dr. Eunika MERCIER-LAURENT



She graduated from Polytechnic of Warsaw (Poland); she then got her Ph.D. thesis in INRIA (Institut National de Recherche en Informatique et Automatique) and Paris 7 University (France) on Natural language retrieval from data bases. She is now a Global Innovation Strategist and Founder of EML Conseil - for Knowledge & Innovation Management since 1994 and E100 expert of ENTOVATION International since 1996. Her own specialties include: global innovation management, architecture of knowledge flow, complex industrial problem solving using knowledge engineering methods and tools, collective experience, collective intelligence, knowledge discovery, semantic web, decision support systems, e-learning and knowledge transfer methods. She is also

an Associate Professor in Institut d'Administration d'Entreprises (University Lyon3) and teacher (including e-learning) of Knowledge and Innovation management and knowledge thinking approach in engineering schools and universities. She is a member of Institut Fredrik Rosing Bull, multidisciplinary group working on influence of new technologies on different areas like decision in complex environment, complex systems security, medicine; influence of natural on artificial brains and machines. She is the Vice-President of AFIA-French Association for Artificial Intelligence, AAI, Transinova, OSEO and ANR expert, Entovation Intl. E100 expert; she is the cofounder of the Mediterranean University of Innovation, Global Forum steering committee, and since 2005, the SIG Editor of the European Knowledge board. Email: eml@wanadoo.fr.

Dr. Pierre NAVIDI



He got his thesis at Laboratoire de Mécanique des Solides of Ecole Polytechnique Ecole des Ponts et Chaussées (1985). He participated in the developments of the special approach of the inelastic analysis of structures and the Advance Intelligent Design of Systems. During several years, in this laboratory, he worked on various projects using a cognitive Knowledge Data extraction engine (SEA), based on a Knowledge Data Description (KDD) framework. After, he joined several projects in telecommunications at Cegetel, France Télécom, and since 2003, he is the Advanced services and solutions Director of OAK Global Group (www.oakgg.com) that is an ALL IP Mobile Broadband Wireless Access (MBWA) system architect and developer Business

development and sale for specific Wimax solutions using MBWA. He defines and develops specific marketing and selling tools in order to design and optimize products and services using ubiquitous voice/data convergence for corporate and institutional services Strategic consulting on spectrum acquisition. Email : Pnavidi@xgstream.com.



Dr. Saïd TAHERI

He holds an Engineering diploma from Ecole Polytechnique Paris (1974) and a Material Engineering diploma from Ecole des Mines de Paris (1976).

He got an HDR (Habilitation to Direct Researchers) from University of Paris (2005) and a PhD thesis from University of Paris (1978) while at the Laboratoire de Mécanique des Solides. He was an assistant Professor and Head of department of material at faculty technique of University of Teheran (1978-1983).

Since, 1983, he is a Senior Research Engineer at Electricité de France R&D at the Department of Accoustic and Mechanical analysis and at LaMSID common research

Laboratory of Electricité de France and CNRS. During his researches, he managed various projects concerning nuclear power plant particularly on the simulation of weld residual stresses, in cyclic plasticity and ratchetting, phenomenological or multilevel constitutive modelling, fatigue under variable amplitude and multi-axial loadings, decomposition of solution in local and global (shell) solution. His current research interests are towards fatigue crack initiation and 3D crack propagation under thermo-mechanical variable amplitude loadings. Email : said.taheri@edf.fr



Dr. Joel FRELAT

received his Docteur-es-sciences in 1981. He was a researcher at the Laboratoire de Mécanique des Solides, Ecole Polytechnique, France where he had his main interests in modeling and numerical simulation of structures, and non-destructive measurements of residual stresses. He is now Associate Professor at Ecole Polytechnique and Chargé de Recherches au CNRS au Laboratoire Modélisation Mathématique Université Paris 6.

Email : joel.frelat@imm.jussieu.fr



Dr. Habib KARAOUNI

joined CADLM in 2002 as Chief of a newly created Advanced Intelligent Design of Systems Department. In 2001, he got his PhD thesis at Laboratoire de Mécanique des Solides of Ecole Polytechnique (France). He is a specialist in fatigue under multi-axial loadings, artificial intelligence, inelastic analysis of structures and robust optimal design; he already published a number of scientific and technical papers. He is an important disseminator of the A.I.D.S approach that he promoted through several industrial applications. His recent realizations concern Optimal Tightening of bolted joint, Shape Optimal Design of Helicoidal Springs, Metal Forming with Shotpeening and Quasi-physical Modelization of Multiaxial Fatigue. Email: h.karaouni@cadlm.fr

and the participations of Dr. Geneviève Inglebert (SupMeca), Dr. Michèle Sebag (LRI), Dr. Jean Casier (EDF).