EUROMECH
European Mechanics Society

Newsletter 19
August 2001

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President's Introduction

The EUROMECH *Council held its annual meeting in Grenoble this year at which it reviewed the activities of the* EUROMECH *Society, the officers and the various conference committees. All five committees are now complete and their membership is published in this Newsletter. The Council elected the President (H.H. Fernholz), the Treasurer (E.J. Hopfinger) and the Secretary General (M. Okrouhlik) for 2002.*

Besides the five EUROMECH *Colloquia for 2002, already decided at the Council meeting in 2000, there were fifteen additional proposals for the consideration of the Council, seven of which were approved for 2002 (5 Solids and 2 Fluids). The twelve Colloquia are announced in this Newsletter and will be held in seven European countries. For the first time we had no proposals for Colloquia from the UK and the Scandinavian countries. Hopefully this is no reflection of the difficulties in the European unification process.*

The Council had a lengthy discussion on the future development of the EUROMECH *Society and a proposal for a resolution is expected for the agenda of the next Council meeting, in Prague in April 2002. As a first result it was decided to award the Fluid Mechanics Prize and the Solid Mechanics Prize of the EUROPEAN MECHANICS Society for outstanding and fundamental contributions to the fields of Fluid or Solid Mechanics every three years. The procedures and guidelines for nominations are in preparation. In this connection we would like to take account of the opinions of members of the society, and ask them to return comments as requested on page 10 of this issue.*

Hans-Hermann Fernholz
President, EUROMECH

Contents

Addresses for EUROMECH Officers

President: Professor Dr.-Ing. Hans H. Fernholz,
Hermann-Föttinger-Institut, Technische Universität Berlin,
Straße des 17. Juni 135, D - 10623 Berlin, Germany.
e-mail: fernholz@hobo.pi.tu-berlin.de
Tel: + 49 30 3142 3359. Fax: + 49 30 3142 1101.

Secretary-General: Doc. Ing. Miloslav Okrouhlík, CSc.,
Head of Mechanics & Solids Department, Institute of Thermomechanics,
Academy of Sciences of the Czech Republic,
Dolejskova 5, 182 00 Prague 8, CZ.
e-mail: ok@bivoj.it.cas.cz
Tel.: + 420 2 6605 3158. Fax: + 420 2 858 4695

Treasurer: Professor Emil.J. Hopfinger,
LEGI/IMG, B.P. 53, 38041 Grenoble Cedex 09, France.
e-mail: emil.hopfinger@hmg.inpg.fr
Tel.: + 33 476 82 50 43. Fax: +33 476 82 52 71.

Journal Editor: Dr. John Finley
Department of Aeronautics,
Imperial College of Science, Technology and Medicine,
Prince Consort Road, London SW7 2BY, UK.
e-mail: aero.time@ae.ic.ac.uk
Tel.: + 44 020 7594 5063. Fax: + 44 020 7584 8120

EUROMECH COLLOQUIA for 2002

EUROMECH Colloquia are informal meetings on specialised research topics. Participation is restricted to a small number of research workers actively engaged in the field of each Colloquium. The organisation of each Colloquium, including the selection of participants for invitation, is entrusted to a Chairman. Proceedings are not normally published. Those who are interested in taking part in a Colloquium should write to the appropriate Chairman.

Number, Title, Chairperson or Co-chairperson, Dates and Location for each Colloquium in 2002:

431. *Direct Numerical Simulation of Moving Interfaces*
Chairman: Prof. Jean-Paul Caltagirone
MASTER-ENSCPB, Avenue Pey-Berland BP 108
F-33402 Talence, France
E-mail: calta@lmaster.u-bordeaux.fr
http://www.lmaster.u-bordeaux.fr/euromech
Co-chairmen: Prof. Eric Arquis, MASTER-ENSCPB, Talence, France,
Prof. Jean-Claude Legros, Université Libre de Bruxelles, Belgium
Date and location: May 14 – 17, 2002, Talence, France

The purpose of the colloquium is to provide a forum for recent scientific and technical advances in the field of interfacial phenomena. This meeting will be more particularly focused on Direct Simulation (DNS) as applied to these problems.

The Colloquium will discuss the latest developments in Direct Numerical Simulation of free surface flows and more generally moving interface problems involving capillarity, liquid-surface or liquid-liquid interaction, bubble flows, droplet impact or liquid-solid phase change. The meeting aims at bringing together the latest work in the fields of fluid mechanics and thermal science in both the industrial and research worlds. The colloquium is intended to provide a broad perspective over the variety of multi-material flows, recent models and numerical methods. The definition and setting up of numerical and experimental Benchmarks are also one of the meeting's objectives.

Major Topics:

- Compressible and incompressible flows of non-miscible fluids,
- Interfaces, phase change and thermo-mechanical stresses,
- Capillary effects and wetting,
- Fluid / solid interactions,
- Instability problems for free surfaces,
- Fixed and moving grid method, refinement techniques,
- Definition of experimental and numerical benchmarks.

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433. *Dynamics of Trailing Vortices*

Chairman: Prof. Wolfgang Schröder
Aerodynamisches Institut, RWTH Aachen
Wüllnerstr. zw. 5 u. 7, D-52062 Aachen, Germany
E-mail: office@aia.rwth-aachen.de
http://www.aia.rwth-aachen.de/euromech433
Co-chairman: Prof. Dieter Jacob, RWTH, Aachen, Germany
Date and location: March 21 – 22, 2002, Aachen, Germany

The colloquium will focus on recent and current research and developments made in the area of dynamics of trailing vortices. Practical applications and fundamental analyses will be discussed. Contributions concerning the formation and merging of vortices, their motion and temporal behaviour, the interaction with various flow phenomena, such as jets and shocks, and atmospheric and ground effects are expected. Furthermore, studies addressing multidisciplinary topics are also welcome. The topics include the aero-acoustic noise generated by wing-tip vortices and flap side-edge vortices or vortex-structure interactions, and studies of fundamental mechanisms, such as vortex breakdown. Developments of numerical as well as theoretical methods and measurement techniques to investigate near and far field vortices and results obtained using various experimental tools, e.g. wind tunnel tests, flight tests, should be presented. Additionally, papers identifying the industrial requirements for prediction methods of trailing vortices should be submitted. Although it is expected that the majority of contributions will be directed at aircraft aerodynamics, papers dealing with trailing vortices in biofluid mechanics, building and vehicle aerodynamics are also desired.

Major Topics

- Formation, motion and merging of vortices
- Atmospheric and ground effects
- Theoretical investigation of vortices
- Interacting flow phenomena
- Vortex breakdown
- Development of numerical and experimental tools
- Vortex-structure interaction
- Vortices in biofluid mechanics
- Vortices in building aerodynamics
- Vortices in vehicle aerodynamics

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434. *Contact Mechanics of Coated Bodies*

Chairman: Prof. Viktor M. Alexandrov
Institute for Problems in Mechanics, Russian Academy of Sciences
Prospekt Vernadskogo 101, building 1, 117526 Moscow, Russia
E-mail: goryache@ipmnet.ru
Co-chairman: Prof. J. J. Kalker, Delft University of Technology
Date and location: 21 – 23 May 2002, Moscow, Russia

The scope of the colloquium is to review current advances in the study of contact interaction, friction and fracture of bodies with coatings. Coated bodies are widely used in tribo-systems to decrease energy losses and to increase wear resistance. The different technologies used for coating implantation produce coatings with

various mechanical and geometrical characteristics and different conditions at the interface. The stress field, temperature distribution and fracture of coated bodies depends essentially on the coating properties.

Major Topics

- rolling/sliding contact of bodies coated by elastic, visco-elastic or plastic layers
- lubricant contact of coated bodies;
- effect of roughness in contact of coated bodies;
- contact interaction of bodies covered by inhomogeneous coatings and multilayers;
- wear contact problems for coated bodies;
- fracture of coated bodies;
- experimental study of contact, friction and fracture of coated bodies.

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435. *Simulation of Friction and Wear in Metal Forming*

Chairman: Prof. Jérôme Oudin
Industrial and Human Automatic Control and Mechanical Engineering
Le Mont Houy, University of Valenciennes
F-59313 Valenciennes Cedex 9, France
E-mail: euromech435@univ-valenciennes.fr
Co-chairman: Prof. Serge Cescotto, University of Liège, Liège, France
Date and location: 18 – 20 June, 2002, Valenciennes, France

The success of forging processes can be enhanced by the use of reliable finite element simulations. On the one hand, mastering of contact algorithms is required to improve the finite element code accuracy. On the other hand, the bulk behavior laws of coatings and lubricants have to be identified in order to refine computations in the near contact zone. Therefore, specific methodologies – using experimental and numerical approaches – can be developed to quantify the friction and wear, and to optimize the forging process.

The colloquium will consider specific simulations of forming processes with friction and contact conditions related to new experiments and testing apparatus. This includes:

- the improvement of contact algorithms,
- the numerical identification of bulk behaviour of lubricants and coatings,
- the numerical characterisation of friction and wear.
- influences of coating and lubrication on the success of the forming process,

Key words : Friction, Wear, Process simulation, Numerical Formulation, algorithm, Coatings, Lubricants, Tribology.

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436. *Nonlinear Waves in Microstructured Solids*

Chairman: Prof. J.Englebrecht, Estonian Academy of Sciences,
Kohtu 6, 10130 Tallin, Estonia
E-mail: je@ioc.ee
Co-chairman: Prof. G.A.Maugin, Paris, France.

The colloquium will cover aspects of dynamics (wave propagation) in structured solid materials. It will focus on the mechanics and physics of media with microstructures of varied origin and non-linear effects related to or interacting with the microstructure. Particular attention will be paid to phase transition front propagation in crystalline substances, propagation of solitary waves in micro-structured media and the non-linear acousto-diagnostics of properties of such materials. Under discussion are shape-memory alloys, crystalline solids, inhomogeneous and micro-damaged materials. Theoretical, experimental and numerical studies will be considered. Discussion should lead to a better understanding of the physical phenomena which affect wave propagation in micro-structured solids and indicate effective methods for analysing these phenomena. The colloquium may be considered as a sequel to EUROMECH 348, 1996, and will reflect progress made since that meeting.

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437. *Identification and Updating Methods of Mechanical Structures*
Chairman: Ing. Jan Kozánek, PhD., Institute of Thermomechanics,
Academy of Sciences of the Czech Republic
Dolejškova 5, 182 00 Prague 8, Czech Republic
E-mail: kozanek@it.cas.cz
Co-chairman: Prof. Gerard Lallement, Besançon, France
Date and location: June 19 – 21, 2002, Prague, Czech Republic

Although identification methods found their origin in the last half century in aeronautics, at the present time they are necessary in many other fields such as machine-building or in civil engineering.

The first idea was to create a mathematical model of the structure to be investigated (with respect to the coefficients in the equation of motion or with respect to the eigenparameters). The development of Finite Element Methods from both a theoretical and practical point of view increases the necessity to verify and improve these models. This is the reason why identification methods are now more oriented towards the eigenvalues and eigenvectors and their parameter sensitivities for use in updating processes.

A simplified spectral and modal identification can also be used in the permanent regime in vibro-diagnostic methods for the maintenance of real structures during their life time.

Major Topics:

- Parametric identification in frequency and time domain
- Curve fitting of transfer functions
- Identification of vibrating systems with small non-linearity
- Spectral and modal sensitivity
- Updating methods of finite element models
- Tuning and vibrodiagnostics of mechanical structures
- Robustness of model-based decisions with respect to uncertainties

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438. *Constitutive Equations for Polymer Micro-composites: On the Border of Mechanics and Chemistry*
Chairman: Dr. Ing. Al. Dorfmann, Ph.D., P.Eng.
Institute of Structural Engineering,
Peter Jordan St. 82, 1190 Vienna, Austria
E-mail: dorfmann@mail.boku.ac.at
Co-chairman: Prof. Drozdov Aleksey, Inst. for Industrial Maths., Israel
Date and location: July 15 – 17, 2002, Vienna, Austria

In recent years, tremendous progress has been made in understanding relations between the chemical structures of polymer micro-composites on the one hand and their mechanical and physical properties on the other. However, most studies were published in specialised journals dealing with the chemistry and physics of macromolecules. The objective of the workshop is to gather specialists actively working in rather diverse areas of polymer science in order to exchange their knowledge and to formulate directions for further research. It is hoped (i) to discuss recent advances in the design of molecular models, (ii) to develop constitutive equations for the mechanical behavior of solid polymers based on various scenarios for deformation at the micro-level, and (iii) to compare results of numerical analysis with available experimental data and results of molecular dynamics simulation.

Major Topics:

- Viscoelasticity, viscoplasticity and anelasticity of solid polymers and polymeric composites.
- . Fracture and fatigue of polymeric composites with rubbery and glassy matrices; cracking and crazing; ultimate strength and toughness; damage mechanics.
- Strain-softening and stress hardening in unfilled and filled elastomers.
- Mechanically-induced crystallisation in rubbery polymers and phase separation in polymeric blends.
- Interfacial effects in polymeric composites; micromechanics of surfaces.
- Structure-property relations for block copolymers and polymeric blends.
- Physical ageing in glassy polymers and polymeric composites.
- Thermal degradation and recovery of solid polymers
- Supra-molecular structures in polymeric micro-composites

439. *Mathematical Modelling of the Dynamic Behaviour of Thin Elastic Structures*

Chairman: Prof. Leonid Yu. Kossovich
Astrachynskaya 83, Faculty of Mathematics and Mechanics
Saratov State University, 410026 Saratov, Russia
E-mail: KossovichLU@info.sgu.ru
Co-chairmen: Prof. Julius D. Kaplunov, University of Manchester, UK
Dr. G.A. Rogerson, University of Salford, UK
Date and location: July 24 – 26, 2002, Saratov, Russia

The colloquium will discuss recent advances in the mathematical theory of thin elastic structures, including plates, rods, shells, thin coatings and interface layers. Such theories are very useful for space technology, submarine detection and many other high-tech domains. The colloquium topics involve vibration problems, transient waves and fluid-structure interaction. The validity of physical hypotheses underlying some well-known engineering schemes will be discussed. Modern trends dealing with the modeling of materials, involving the effects of anisotropy and/or pre-stress; and the analysis of high-frequency and short-wave phenomena will be of particular interest. Advanced mathematical approaches, in particular asymptotic methods characteristic of thin structures, will be well represented.

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440. *Aerodynamics and thermochemistry of high speed flows*

Chairman: Dr. J.P. Dussauge,
IUSTI, Supersonic Group, 12 Av. Général Leclerc, 13003 Marseille, France
Fax: (33) 4 91 10 85 32
E-mail: dussauge@iusti.univ-mrs.fr
Co-chairman:Prof. A. Chikhaoui, IUSTI, Université de Provence Marseille
Date and location: Marseille, France, September 16 – 19, 2002

The scope of the meeting covers the scientific problems relevant to supersonic and hypersonic flight, in aeronautical situations and in various phases of atmospheric re-entry. Theoretical, computational modelling and experimental studies will be considered: original experimental work, CFD methods for equilibrium and non-equilibrium flows, including direct numerical simulations and models of compressible turbulence; novel experimental methods, with emphasis on optical diagnostics. The related fields in the applications involve drag reduction, laminar and turbulent flow control, determination of aerodynamic loads, design of heat shields etc.

The aerodynamic aspects will focus on the properties of large-scale structures in situations of interest for aeronautics and aerospace. They will include compressible turbulence, laminar/turbulent transition, shock wave stability and shock interactions.

The physico-chemical aspects will include real gas effects: relaxation, kinetics and transport phenomena, with particular attention to physico-chemical and radiative processes in compressed and expanded flows. Non equilibrium flows in external or internal aerodynamics will also be considered

444. *Critical review of the theories of plates and shells and new applications*

Chairman: Prof. Dr.-Ing. R. Kienzler, University of Bremen,
IW3, P.O.Box 330440, D-28334 Bremen, Germany
E-mail: rkienzler@uni-bremen.de
Co-chairman: Prof. Dr.-Ing. H. Altenbach, Martin-Luther-Universität Halle-Wittenberg, Germany
Date and location: September 24 – 28, 2002, Bremen, Germany

The foundations of the theory of plates and shells have been developed using various completely different and, at first glance, independent approaches: *a priori* hypothesis concerning the states of stress and/or strain, kinematic assumptions, mathematical techniques (power series, asymptotic methods, special functions, etc.) and the so-called direct approach. Although all theories proposed have their origin in the underlying three-dimensional theory of continuum mechanics, a comprehensive assessment of the approaches and the balancing of advantages against disadvantages of a theory in consideration of new application fields is quite difficult.

Several improvements have been suggested, with respect to new application fields. The use of composites yields a new branch of plate theory. Other developments are related to piezoelectric materials (sensors, activators), thermal loading conditions and plates made of foams. Based on the governing equations of the numerous theories, numerical methods (the finite element method, the finite difference method, the boundary element method) have been developed and applied to problems of practical importance in mechanical and civil engineering. In addition, experimental techniques have been matured to examine the theoretical predictions.

The aim of the proposed EUROMECH Colloquium is to bring together specialists in the theory of plates and shells, to review the common origins of the different theories and approaches. The advantages and limits of the various concepts and the consequences for practical applications will be considered.
A major part of the meeting, however, will be devoted to the challenges for plate and shell theories in new application fields, in particular inelastic material behaviour, damage, non-stationary thermal loading, non-mechanical effects and laminate structures.

Major Topics:

- Foundations of the theories of plates and shells
- Modifications or extensions due to new application fields
- Advanced analytical and numerical solution techniques
- Experimental verification of theoretical assumptions.

EUROMECH: Fluid Mechanics and Solid Mechanics Prizes

Dear EUROMECH Member,

EUROMECH, the European Mechanics Society, proposes to award, every three years, two prizes:

- The EUROMECH Fluid Mechanics Prize
- The EUROMECH Solid Mechanics Prize

These are intended to recognise outstanding research accomplishments in Fluid Mechanics and Solid Mechanics respectively. Details of the proposed selection procedure of the prize nominee are given on the following page.

We would like to receive your comments on the principle of awarding these prizes and also possibly on the selection procedure. The EUROMECH Council will make a final decision at its next meeting, in March 2002, taking into account any comments from the members.

It is suggested that we award these prizes in order to increase the visibility of the Mechanics Community at large, and to give recognition to distinguished scientists by their colleagues. At the recent Fluid Mechanics and Solid Mechanics Conferences, prizes were awarded to "Young Scientists" for contributions to the meetings, and this initiative was well received.

We ask for your comments under the headings:

1. Comments on the general idea and the usefulness of awarding such prizes.
2. Comments on the selection procedure.

We would appreciate your comments however short, but ask you to register your agreement or disagreement.

Please send your comments on the enclosed answer sheet *before November 15th* to

Professor Hans H. Fernholz,
Hermann-Föttinger-Institüt für Strömungsmechanik,
Technische Universität Berlin,
Strasse des 17 Juni 135,
D-10623 Berlin.

Fax: 49 3031 421101

H.Fernholz
President

P r o p o s a l

EUROMECH FLUID MECHANICS PRIZE

EUROMECH SOLID MECHANICS PRIZE

The *Fluid Mechanics Prize* and the *Solid Mechanics Prize* of EUROMECH, the *European Mechanics Society,* shall be awarded every three years for outstanding and fundamental contributions to the fields of Fluid or Solid Mechanics. Eligible recipients will have made a significant part of their scientific career in Europe.

Each prize will consist of 5000 Euro. The recipient is invited to give a Prize Lecture at one of the European Fluid or Solid Mechanics Conferences held every three years.

Nomination Guidelines:

A nomination may be submitted by any member of the mechanics community. The nomination documents should include the following items:

- a presentation letter summarising the contributions and achievements of the nominee in support of his/her nomination for the prize,
- a *curriculum vitae* of the nominee,
- a list of the nominee's publications,
- at least two letters of recommendation.

Five copies of the complete nomination package should be sent to the chair of the appropriate Prize Committee, as announced in the EUROMECH Newsletter and on the societies web-site <www.euromech.org>. Nominations will remain active for two selection campaigns.

Nomination Deadlines for both prizes: **January 31st 2003**

Prize Committees:

For each prize, a Prize Committee, with a Chair and two members shall be appointed by the EUROMECH Council for a period of three years. The Chair and the two members may be re-appointed once. The committee shall select a recipient from the nominations.

EUROMECH CONFERENCE COMMITTEES from 2001

The EUROMECH Fluid Mechanics Conference Committee

Prof. L van Wijngaarden (Chairman) 1997 - 2002
Laboratorium voor Warmte-en Stromingsleer, University of Twente,
Postbus 217l, NL-7500 AE Enschede, The Netherlands

D. Abrahams (Manchester)	2001 – 2006
P. Blondeaux (Genova)	1998 - 2003
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E.J. Hopfinger (Grenoble)	1995 – 2003
P. Huerre (Palaisseau)	2001 – 2006
A. Kluwick (Wien)	2002 – 2007
J. Magnaudet (Toulouse)	2001 – 2003
V. Meleshko (Kiev)	2001 – 2006
W. Schröder (Aachen)	2001 – 2006

The EUROMECH Solid Mechanics Conference Committee

Professor B. Schrefler (Chairman) 1998 – 2003
Dipartimento di Costruzioni e Trasporti, Universita di Padova
Via Marzolo 9, 35131 Padova, Italy
bas@caronte.dic.unipd.it

A. Benallal (Cachan)	2001 – 2006
J. Botsis (Lausanne)	2001 – 2006
N. Fleck (Cambridge)	2001 – 2006
I. Goryacheva (Moscow)	1998 – 2003
M. Langseth (Trondheim)	2001 – 2006
M. Okrouhlík (Praha)	1998 – 2003
M. Potier-Ferry (Metz)	1998 – 2003
F.G. Rammerstorfer (Wien)	1998 – 2003
H. Ulbrich (Essen)	2001 – 2006

The EUROMECH Turbulence Conference Committee

Professor L. Kleiser (Chairman) 2001 – 2003
Institut für Fluiddynamik, ETH - Zentrum,
CH – 8092 Zürich, Switzerland

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I.P. Castro (Southampton)	2001 – 2002
Y. Couder (Paris)	2001 – 2003
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G.J.F. van Heijst (Eindhoven)	2001 – 2003
A.V. Johansson (Stockholm)	2001 – 2006
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D. Ronneberger (Göttingen)	2001 – 2003
J.C. Vassilikos (London)	2001 – 2006

The EUROMECH Nonlinear Oscillations Conference Committee

Prof. Dr.-Ing. E. Kreuzer (Chairman) 1997 – 2002
TU Hamburg-Harburg, Arbeitsbereich Meerestechnik II,
D - 21071 Hamburg, Germany

S.R. Bishop (London)	1997 – 2002
J.P. Pascal (Arcueil)	1997 – 2002
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G. Stépán (Budapest)	2000 – 2005
D. Klimov (Moscow)	2000 – 2005
H. True (Lyngby)	2000 – 2005
G. Rega (Roma)	1997 – 2002
H. Troger (Wien)	1997 – 2002
F. Peterka. (Praha)	1997 – 2002

The EUROMECH Material Mechanics Conference Committee

Y. Berthaud (Chairman) 2001 - 2006
Laboratoire de Mécanique et Technologie - Cachan
61 avenue du Président Wilson, F-94235 Cachan Cedex, France
e-mail: berthaud@lmt.ens-cachan.fr

G. Eggeler (Bochum)	1997 - 2003
F.D. Fischer (Leoben)	1997 – 2003
E. van der Giessen (Groningen)	1997 – 2003
P. van Houtte (Leuven)	1997 – 2003
V. Tvergaard (Lyngby)	1997 – 2003
E.P. Busso (London)	2001 – 2006
J. Kratochvil (Praha)	2001 – 2006
A. Dragon (Chasseneuil)	2001 – 2006
N. Aravas (Volos)	2001 – 2006