

**DRUŠTVO ZA INTEGRITET I VEK KONSTRUKCIJA
SOCIETY FOR STRUCTURAL INTEGRITY AND LIFE**

Eighth International Fracture Mechanics Summer School - IFMASS 8

FROM FRACTURE MECHANICS TO STRUCTURAL INTEGRITY ASSESSMENT

REPORT

Introduction

First International Fracture Mechanics Summer School (IFMASS 1) "Introduction to fracture mechanics and fracture-safe design" had been organized in 1980 by Faculty of Technology and Metallurgy, Belgrade and GOŠA Institute, Smederevsska Palanka on the initiative of Prof. Michael Wnuk (University of Wisconsin, Milwaukee), and Prof. Stojan Sedmak (Faculty of Technology and Metallurgy, Belgrade). It happened that Prof. Wnuk was the guest of Prof. S. Sedmak at the Faculty of Technology and Metallurgy for his sabbatical in 1980, and by the end of the visit he proposed to organize IFMASS 1. The School attracted 63 participants, and 20 lectures, followed by one invited discussion had been presented. IFMASS 1 staff included 6 lecturers from abroad:

Prof. M. Wnuk (2 lectures), Dr. M. Ratwani - Northrop Co, U.S.A (5 lectures), Prof. A. Mazur – Academy of Mining and Metallurgy, Krakow (2 lectures), Doc. J. Orkish – Technical University, Krakow, Doc. A. Javorski, Technical Faculty, Warsaw, Dr. A. Neimitz, Technical University, Kielce, and

7 lecturers from Yugoslavia:

Prof. A. Radović, Military Technical Institute, Belgrade (2 lectures), Prof. Lj. Nedeljković, Faculty of Technology and Metallurgy, Belgrade, Dr. M. Berković, Aircraft Technical Institute, Belgrade, Prof. J. Pirš, Technical Faculty, Rijeka, Prof. S. Sedmak, Faculty of Technology and Metallurgy, Belgrade, Doc. J. Jarić, Faculty of Sciences, Belgrade, prof. M. Radojković, Civil Engineering Faculty, Belgrade,

and invited discussion had been given by Đ. Dobi, Steelworks Ravne.

The industry strongly supported the organization of IFMASS 1 and the basic budget had been obtained by GOŠA Holding Co and its Institute. This was the time of penstock construction of Bajina Bašta pumping-up hydroelectrical power plant. The most stressed part of the penstock has been constructed of SUMITEN 80P steel (SM 80P weldable steel of 700 MPa nominal yield stress). The experience with welding of this class of steel was not sufficient, and the fracture resistance of SM 80P steel and its weldments was not properly defined. This situation explains the interest of industry for fracture mechanics, that is confirmed by number of participants to IFMASS 1. The monograph, entitled as IFMASS 1, has been published in Serbian. Thanks to

the support of this kind, fracture mechanics has been introduced in local industry broadly, as this can be concluded from the presentation given in a monograph about fracture mechanics development in the word, edited by G. Sih in 1981.

The demand from industry supported the organization of IFMASS 2 "Modern aspects of design and construction of pressure vessels and penstocks", 1982, IFMASS 3 "Fracture mechanics of weldments", 1984, IFMASS 4 "Prospective of fracture mechanics development and application", 1986, with continuously increased number of participants and extended number of lecturers, both from abroad and from Yugoslavia. The round table discussions and significant number of participants, presented by invited young experts from Yugoslavia, contributed to the extended introduction of fracture mechanics to its practical application for structural integrity assessment. Monographs, published in Serbian after each IFMASS, also contributed to extended application of fracture mechanics. The next School, IFMASS 5, "The application of fracture mechanics to residual life assessment of thermoelectrically power plant components" had been organized in 1989. This was the biggest IFMASS, with 142 participants, the monograph has been published in English, and only shortened version in Serbian.

So, five IFMASS's had been organized in eighties of the past century. It is to mention that in time period 1982-1992, joint Yugoslav – U.S. research project "Fracture mechanics of weldments" had been realized, with contribution of National Institute of Standards and Technology (NIST) from U.S.A. and six research&development institutions from Yugoslavia.

Unhappy events, started by secession of Slovenia from Yugoslavia in the days of IFMASS 6 ("Service cracks in pressure vessels and storage tanks" organized in June 1991), reduced the activities in fracture mechanics, and consequently the IFMASS. The IFMASS 6 monograph had been published three years later, in 1994. Next three years passed before it was possible to organize next, IFMASS 7 "Experimental and numerical methods of fracture mechanics" in 1997. Again, the activities had been stopped due to NATO aggression on our country in 1998, and the monograph has been published in the year 2000.

The appearance of the IFMASS 7 monograph revealed the possibility to continue the activity in fracture mechanics, accounting for critical situation with the equipment in local industry, especially destroyed and damaged by NATO bombardment, and necessity to assess structural integrity of equipment. The experts from Serbia & Montenegro, previously engaged in IFMASS, decided to organized the Society for structural integrity and life (DIVK) in 2001. New established DIVK journal "Structural integrity and life" also attracted many experts to contribute in this area. After consolidation of DIVK, the renew of IFMASS had been required by the members. On the other hand, new situation in South-Eastern Europe offered the possibility the experts from regional countries to take part in IFMASS. After consideration, the experts from our country, Bulgaria and Greece, decided to organize jointly next IFMASS.

The IFMASS 8 had been supported by Ministry for Science, Technologies and Development and Ministry for Urban Planning and Construction of Gouvernement of Serbia, GOŠA FOM, Institute for Material Testing, Company NBGH –ŽIKS HARD and Company Zwick – Roell.

Prof. Dr. Dragan Domazet, Minister of Science, Technolgies and Development, opened IFMASS 8.

Procedure of IFMASS 8 preparing

After decision about the title, content and term of IFMASS 8 by the Scientific Advisory Board, provisional program had been defined and presented in call for participation.

Society for Structural Integrity and Life (DIVK)

GOŠA Insitute

Faculty of Technology and Metallurgy

in cooperation with

Ministry of Science, Technologies and Development of Serbia

City Assembly of Belgrade

Military Technical Institute

under the auspice of

European Structural Integrity Society - ESIS

organize

Eigth International Fracture Mechanics Summer School IFMASS 8

FROM FRACTURE MECHANICS TO STRUCTURAL INTEGRITY ASSESSMENT

Belgrade, 23rd to 27th June 2003

City Hall

Belgrade, Trg Nikole Pašića 2

Previous seven International Fracture Mechanics Summer Schools (IFMASS) had been organized from 1980, the last one took place in 1997. After that, there was no possibility to organize IFMASS, due to well known situation in former Yugoslavia. Meanwhile, in 2001 the Society for Structural Integrity and Life (DIVK) has been established in Belgrade. The DIVK members had been the organizers and participants in previous IFMASS. The success of previously organized IFMASS and its importance motivated DIVK to continue with IFMASS 8 in 2003. On the meetings, held during 14th European Conference on Fracture (ECF 14) in September 2002 in Cracow, with the participation of Prof. L. Toth (Hungary), the chairman of ESIS Commission TC13: Education and Training, Prof. E. Gdoutos (Greece), Prof. D. Angelova (Bulgaria) and Prof. S. Sedmak (Srbija) it has been decided to organize IFMASS 8 for South-Eastern European countries.

The title "From Fracture Mechanics to Structural Integrity Assessment" enables to review the development and practical application of fracture mechanics. The participants can be acquainted with structural integrity problems in different stages (design and material selection, manufacturing and quality assurance, service, maintenance, repair) through the lectures, selected for the program.

Joint organization of IFMASS of South-Eastern Europe countries, under the auspice of European Structural Integrity Society (ESIS) could be considered as the first step in founding the regional Forum for Structural Integrity of South-Eastern European Countries. Recently, at the regional meeting, held in Belgrade, the cooperation in this region is strongly recommended by the governments and encouraged by European Union. The organizers of the Forum can account in future with the help of governmental institutions and of European Union.

Scientific Advisory Board

Prof. Dr. Stojan Sedmak	Prof. Dr. Dorin Dehelean	Prof. Dr. Laszlo Toth
Prof. Dr. Michael Wnuk	Prof. Dr. Dragoslav Šumarac	Prof. Dr. Stefan Vodeničarov
Prof. Dr. Donka Angelova	Prof. Dr. Emmanuel Gdoutos	Prof. Dr. Jovo Jarić

Organizing Committee

Mr Ljubica Milović, secretary	Prof. Dr. Milosav Ognjanović	Dr. Zijah Burzić
Prof. Dr. Stojan Sedmak	Dr. Vencislav Grabulov	Mr. Zoran Radaković
Prof. Dr. Aleksandar Sedmak	Mr. Dejan Momčilović	Prof. Dr. Nenad Radović
Prof. Dr. Katarina Gerić	Mr. Milorad Zrilić	Dr. Miodrag Arsić
Prof. Dr. Dragoslav Kuzmanović	Dr. Marko Rakin	Aleksandar Bređan

Jano

Registration fee:

- 150 EUR
- 100 EUR for ESIS members, 50 EUR for students

Accommodation

The accommodation is available in the hotels in the vicinity of City Hall at prices 25 to 60 Euro. For further information please visit our web site: **divk.org.yu** or contact:

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Prof. Dr. Stojan Sedmak

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Program of IFMASS 8

1. J. Jarić, A. Sedmak: "Physical and mathematical aspects of fracture mechanics"
2. E. Gdoutos: " Fracture mechanics under mixed -mode loading"
3. M. Wnuk: "Enhancement of fracture toughness due to energy screening effect in the early stages of non-elastic failure"
4. D. Krajčinović, D. Šumarac: "Basic principles of damage mechanics"
5. A. Radović, N. Radović: " A contribution of fracture mechanics to material design"
6. R. Nikolić, J. Veljković: 'Interfacial cracks '
7. D. Angelova: "Basic fatigue conceptions and new approaches to fatigue failure"
8. V. Grabulov: "Static and impact tests (tensile, drop weight, explosion bulge) and result analysis"
9. G. Lenkey: "Charpy impact testing and its application in fracture mechanics"
10. J.Landes: "Development of experimental testing of crack behavior"
11. S. Sedmak, Z. Burzić: "Fracture mechanics standard testing"
12. K. Gerić, I. Blačić: "Fractographic analysis"
13. V. Šijački-Žeravčić: "In-service failure of structures: examples"
14. P. Agatonović: "Fracture case studies – basic principles"
15. V.T.Troščenko: "Fracture toughness of metal under cyclic loading"
16. L. Toth: "The role of fracture mechanics parameters in reliability assessment of engineering structures operating under different loading conditions"
17. G. Pluvinage: "Fracture transferability problems and mesofracture"
18. S. Vodeničarov: "Fracture testing in nuclear power stations"
19. D. Dražić, B. Jegdić: "Corrosion and stress corrosion"
20. T. Maneski: "Stress analysis for structural integrity assessment"
21. Gui-Rong Liu: "Meshfree methods (in numerical analysis)"
22. N. Gubeljak: "SINTAP-Structural INTEgrity Assessment Procedure"
23. M. Kojić, M. Živković: "Numerical programs for life assessment of thermoelectrical power plants"
24. Karl-Heinz Schwalbe:"Structural assessment under elastic-plastic conditions with particular reference to mechanically heterogeneous structures"
25. M. Ognjanović: "Reliability and safe service of structures"
26. V. Gliha: "Prediction of fracture and fatigue properties of welds by simulated HAZ"

Lecturers, lectures, and timetable of IFMASS 8

Realized program is slightly different from announced one. Due to unexpected problems, Prof. M. Wnuk and Prof. E. Gdoutos cancelled, so their lectures (2 and 3 from the announced list) had been omitted. Having in mind the general IFMASS 8 title, a new lecture is included (Nr 25).

Performed program and timetable of IFMASS 8 and Workshop

Lecture	
Lecturer	
Affiliation	

A. Theoretical background**1**

Physical and mathematical aspects of fracture mechanics

Prof. Jovo Jarić

Prof. Aleksandar Sedmak

Faculty of Sciences, Belgrade, S&MN

Mechanical Engineering Faculty, Belgrade

2

Basic principles of damage mechanics

Prof. Dušan Krajčević,

Prof. Dragoslav Šumarac

Arizona State University, Tempe, Az, USA

Faculty of Civil Engineering, Belgrade, S&MN

3

A contribution of fracture mechanics to material design

Prof. Aleksandar Radović

Prof. Nenad Radović

Faculty of Technology and Metallurgy,

Belgrade, S&MN

4

Interfacial cracks

Prof. Ružica Nikolić

dr Jelena Veljković

Mechanical Engineering Faculty, Kragujevac,

S&MN

5

Basic fatigue conceptions and new approaches to fatigue failure

Prof. Donka Angelova

University of Chemical Technology and

Metallurgy, Sofia, Bulgaria

B. Experiments and testing

6

Static and impact testing (tensile test, drop weight test, explosion bulge test) and result analysis

Dr. Vencislav Grabulov

Military Technical Institute, Belgrade, S&MN

7

Charpy impact testing and its application in fracture mechanics

Docent Gyöngyvér Lenkey

University of Miskolc, Miskolc, Hungary

8

Development of experimental testing of crack behaviour

Prof. John Landes

The University of Tennessee, Knoxville, Tn, USA

9

Fracture mechanics standard testing

Prof. Stojan Sedmak

Dr. Zijah Burzić

Faculty of Technology and Metallurgy, Belgrade

Military Technical Institute, Belgrade, S&MN

10

Fractographic analysis

Docent Katarina Gerić

Faculty of Technical Sciences, Novi Sad, S&MN

C. Service problems

11

In-service failure of structures: examples

Prof. Vera Šijački-Žeravčić

Mechanical Engineering Faculty, Belgrade

12

Fracture case studies – basic principles

Dr. Petar Agatonović

Consulting and Analysis (CA), Germany

13

Fracture toughness of metal under cyclic loading

Acad. Prof. Valerij T.

Troshchenko

Institute for Problems of Strength, Academy of

Sciences of Ukraine, Kiev, Ukraine

14

The role of fracture mechanics parameters in reliability assessment of engineering structures operating

Prof. Laszlo Toth

Bay Zoltan Foundation, Miskolc, Hungary

15

Fracture transferability problems and mesofracture

Prof. Guy Pluvinage

University of Metz, Metz, France

16

Fracture testing in nuclear power stations

Dr. Stefan Vodeničarov

Institute of Metal Science, Bulgarian Academy of Sciences, Sofia, Bulgaria

17

Corrosion and stress corrosion

Acad. Dragutin Dražić

Mr. Bore Jegdić

Serbian Academy of Science and Art, Belgrade

Military Technical Institute, Belgrade

D. The assessment and extension of residual life

18

Stress analysis for structural integrity assessment

Prof. Taško Maneski

Mechanical Engineering Faculty, Belgrade

19

Meshfree methods (in numerical analysis)

Prof. Gui-Rong Liu

University of Singapore, Singapore

20

SINTAP (Structural INTEGRity Assessment Procedure)

Docent Nenad Gubeljak

Mechanical Engineering Faculty, Maribor,

Slovenia

21

Numerical programs for life assessment of thermoelectrical power plants

Prof. Miloš Kojić

Prof. Miroslav Živković

Mechanical Engineering Faculty, Kragujevac,

S&MN

22

Structural assessment under elastic-plastic conditions with particular reference to mechanically heter

Prof. Karl-Heinz Schwalbe

GKSS Forschungszentrum, Geesthacht,

Germany

23

Reliability and safe service of structures

Prof. Milosav Ognjanović

Mechanical Engineering Faculty, Belgrade

24

Prediction of fracture and fatigue properties of welds by simulated HAZ

Docent Vladimir Gljha

Mechanical Engineering Faculty, Maribor,

Slovenia

25

The application of fracture mechanics to structural integrity assessment

Prof. Aleksandar Sedmak

Mechanical Engineering Faculty, Belgrade

Monday

Tuesday

Wednesday

Thursday

Friday

9.00

Opening

9.00

Lecture 22

7.45

MTI visit

8.30

Lecture 16

8.30

Lecture 21

9.30

Coffee

9.50

Lecture 13

8.30

Greeting word

9.20

Lecture 5

9.20

Lecture 15

9.45

Lecture 1

10.40

Coffee

8.45

Lecture 6

10.05

Coffee

10.10

Lecture 20

10.35

Lecture 8

11.00

Lecture 4

9.20

Lecture 9

10.20

Lecture 11

11.00

Lecture 23

11.30

Lecture 14

11.50

Lecture 12

9.50

Coffee break

11.10

Lecture 19

11.50

Lecture 25

10.15

Laboratories

12.00

Lecture 17

15.00

Workshop A

16.00

Coffee

16.00

Coffee

16.00

Coffee

17.00

Coffee

16.15

Lecture 7

16.15

Lecture 2

16.15
Lecture 24
17.15
Workshop B
17.05
Lecture 3
17.05
Lecture 18
20.00
Joint dinner
17.05
Lecture 10
20.00
Workshop dinner

List of IFMASS 8 participants

Name	Country and affiliation
1	Abdunasser Hamza Fadel Libya
2	Adžiev Gorgi Macedonia – Mechanical Engineering Faculty, Skopje
3	Aleksić Boško Serbia & Montenegro (S&MN) - HIP Azotara, Pančevo

4

Aleksić Vujadin

S&MN - Institute Goša, Belgrade

5

Aleksiev Pavel

Bulgaria – Institute of Metal Science, Sofia

6

Amad Adeen A.Baiuk

Libya

7

Anđelković Zoran

S&MN - Institute Goša, Belgrade

8

Anyiam Hyacinth

U.S.A.

9

Argob Omar Muhamed

Libya

10

Armand Pashnjari

Albania - Technical University – Politechnics Tirana

11

Bakić Gordana

S&MN - Faculty of Mechanical Engineering, Belgrade

12

Bedkowski Wlodimierz

Poland – Technical University of Opole

13

Bisev Yordanov

Bulgaria – Institute of Metal Science, Sofia

14

Bogner Martina

S&MN - Welding Institute, Belgrade

15

Božanić Vojislav

S&MN - Institute for Material Testing (IMS), Belgrade

16

Burzić Meri

S&MN - Military Technical Institute, Belgrade

17

Cvetković Dragomir

S&MN

18

Cvijović Zorica

S&MN - Faculty of Technology and Metallurgy, Belgrade

19

Čamagić Ivica

S&MN - Faculty of Mechanical Engineering, K. Mitrovica

20

Čizmić Zlatan

Bosnia & Hercegovina (B&H) - Technical Faculty, Bihać

21

Čurović Jelisav

S&MN - Military Technical Institute, Belgrade

22

Čulafić Vuk

S&MN - Faculty of Mechanical Engineering, Podgorica

23

Davidkov Aleksandar

Bulgaria – Institute of Metal Science, Sofia

24

Doleček Vlatko

B&H - Faculty of Mechanical Engineering, Sarajevo

25

Doll Verner

Germany - ROELL AMSLER

26

Drča Siniša

S&MN - Oil Refinery, Belgrade

27

Dorđević Vladimir

S&MN - Faculty of Mechanical Engineering, Kragujevac

28

Đukić Miloš

S&MN - Faculty of Mechanical Engineering, Belgrade

29

Đurović Aleksandar

S&MN - Faculty of Mechanical Engineering, Belgrade

30

Eberth Pavel

Germany - ZWICK/ROELL

31

Gido Anca

Romania - Technical Univesity, Timisoara

32

Gočev Jovan

Macedonia - Mechanical Engineering Faculty, Skopje

33

Golubović Zoran

S&MN - Faculty of Mechanical Engineering, Belgrade

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Grabulov Aleksandar

S&MN - Military Technical Institute, Belgrade

35

Grujić Biljana

S&MN -Lola Institute, Belgrade

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37

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S&MN - Military Technical Institute, Belgrade

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S&MN - Institute for Material Testing (IMS), Belgrade

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S&MN - Institute for Material Testing (IMS), Belgrade

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51

Kozak Dražan

Croatia – Mechanical Engineering Faculty, Slavonski Brod

52

Kutin Marina

S&MN - Institute Goša, Belgrade

53

Kuzmanović Dragoslav

S&MN - Traffic Engineering Faculty, Belgrade

54

Mandić Slavko

S&MN - Electricity Board of Serbia, Belgrade

55

Mersida Manjgo

B&H - Faculty of Mechanical Engineering, Mostar

56

Marić Miloš

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Marin Kachakov

Bulgaria – Institute of Metal Science, Sofia

58

Marković Miloje

S&MN - Institute for Material Testing (IMS), Belgrade

59

Martin Lolov

Bulgaria – Institute of Metal Science, Sofia

60

Matejiček Franjo

Croatia – Mechanical Engineering Faculty, Slavonski Brod

61

Međo Bojan

S&MN - Faculty of Sciences, Belgrade

62

Mićunović Milan

S&MN - Faculty of Mechanical Engineering, Kragujevac

63

Milenković Svetlana

S&MN - GOŠA Holding Company, Smederevska Palanka

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Milosavljević Anđelka

S&MN - Faculty of Mechanical Engineering, Belgrade

65

Milotić Milan

B&H. Republika Srpska - High Technical School, Doboj

66

Milović Ljubica

S&MN - Faculty of Technology and Metallurgy, Belgrade

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Mladenović Mladen

S&MN - Institute for Material Testing (IMS), Belgrade

68

Mohamed Munir H.

Libya

69

Momčilović Dejan

S&MN - Institute for Material Testing (IMS), Belgrade

70

Murat Buyuk

Turkey – Gebze Institute of Technology

71

Musa M.H.Abdullraman

Libya

72

Mustapić Angela

B&H - Mechanical Engineering Faculty, Mostar

73

Nalet Jean

The Netherlands - Technobar

74

Nedeljković Ivan

S&MN - Minel Boiler Company, Belgrade

75

Nikačević Milutin

S&MN - Military Technical Institute, Belgrade

76

Nikolić Dobrica

S&MN - Faculty of Mining and Geology, Belgrade

77

Nina Kordić

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78

Odanović Zoran

S&MN - Military Technical Institute, Belgrade

79

Pavel Eskenazi

Bulgaria – Institute of Metal Science

80

Petzek Edward

Romania – Technical University, Timisoara

81

Petzek Mona

Romania

82

Posavljak Strain

B&H, Republika Srpska –ORAO, Bijeljina

83

Potkonjak Željko

S&MN - REFIT

84

Putić Slaviša

S&MN - Faculty of Technology and Metallurgy, Belgrade

85

Radaković Zoran

S&MN - Faculty of Mechanical Engineering, Belgrade

86

Radivojević Božidar

S&MN

87

Rakić Pavle

S&MN - HIP Petrohemija, Pančevo

88

Rakin Marko

S&MN - Faculty of Technology and Metallurgy, Belgrade

89

Rašuo Boško

S&MN - Faculty of Mechanical Engineering, Belgrade

90

Salah Salem Musbah

Libya

91

Simović Željko

S&MN - Minel Boiler Company, Belgrade

92

Spasić Vladimir

S&MN - Welding Institute, Belgrade

93

Stašević Milenko

S&MN - NIS Naftagas

94

Stevanović Radiša

S&MN - GOŠA FOM, Smederevka Palanka

95

Sarkočević Živče

S&MN - Secondary Technical School, Štrpce

96

Sestak Ivan

S&MN - Faculty of Mining and Geology, Belgrade

97

Strbački Živko

S&MN – KONMAT, Belgrade

98

Tanasijević Miloš

S&MN - Faculty of Mining and Geology, Belgrade

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S&MN - HIP Petrohemija, Pančevo

100

Vasović Nebojša

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101

Vosika Zoran

S&MN - Faculty of Sciences, Belgrade

102

Vračarić Dušan

S&MN - Military Technical Institute, Belgrade

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Vratnica Maja

S&MN - Faculty of Technology and Metallurgy, Podgorica

104

Vukojević Nedeljko

B&H - Faculty of Mechanical Engineering, Zenica

105

Yordanova Rozina

Bulgaria - University of Chemical Technology, Sofia

106

Zeković Danijela

S&MN - GOŠA FOM, Smederevska Palanka

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Zrilić Milorad

S&MN - Faculty of Technology and Metallurgy, Belgrade

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Žibera Ana

S&MN - Faculty of Sciences, Belgrade

Workshop New Trends in Fracture Mechanics Application

The workshop had been organized as a satellite event after IFMASS 8, by Society for Structural Integrity and Life (DIVK), Belgrade Chamber of Economy, GOŠA Institute and Faculty of Technology and Metallurgy.

European Union (EU) and its institutions in many cases support the organization of workshops, devoted to specific topics. Taking into account further cooperation in South-East Europe, supported by EU, and proposed establishment of Forum for Structural Integrity in this region, workshops can be convenient form for the cooperation. The Forum will organize the activity toward and on the benefit of the industry, as it is the case with Society for Structural Integrity and Life (DIVK) in Serbia and Montenegro. IFMASS 8 was the place for meeting of experts in structural integrity and fracture mechanics, not only from South-East Europe, offering the possibility to start with organization of workshops. Up to thirty experts in fracture mechanics and structural integrity assessment from all countries of the region are invited to take part in the Workshop.

The interest of practical application of fracture mechanics is extended in last years to many new sectors. Two of them are selected for this Workshop and the world known experts in the field are invited to present state of the art and govern the discussion:

Section A: Development of Ceramic Matrix Composites (CMC)

Dr. Petar Agatonovic, Germany, will present the development of CMC for high temperature application, interesting for the advancement in space program.

Section B: Mesoscopic approach of mechanical properties of materials

Prof. Guy Pluvinage, University of Metz, Metz, France proposed European project under given title. It is assumed that after material science approach based on "micro to macro", future developments in material science in general, and of nano and multi materials in particular, need a new paradigm mainly based on mesoscopic approach, in order to solve the problem of transferability of mechanical properties.

List of Workshop participants

1. Pashnjari Armand, Albania
2. Vukojevic Nedeljko, B&H
3. Posavljak Strain, B&H (Republika Srpska)
4. Prof. Angelova Donka, Bulgaria
5. Doc. Gočev Jovan, Macedonia
6. Petzek Edward, Romania
7. Gido Anca, Romania
8. Dr. Burzić Zijah, S&MN
9. Dr. Grabulov Vencislav, S&MN
10. Mr. Milović Ljubica, S&MN
11. Prof. Sedmak Stojan, S&MN
12. Prof. Katarina Gerić, S&MN
13. Prof. Nenad Radović, S&MN
14. Bedkowski Wlodimierz, Poland

1. Murat Buyuk, Turkey
2. Dr. Petar Agatonović, Germany
3. Prof. Guy Pluvinage, France
4. Prof. Gui-Rong Liu, Singapore
5. Dr. Rakin Marko, S&MN
6. Prof. Jovo Jarić, S&MN
7. Zrilić Milorad, S&MN
8. Jakovic Dragan, S&MN
9. Momčilović Dejan, S&MN
10. Burzic Meri, S&MN
11. Ignjatovic Dragan, S&MN
12. Ivo Blačić, S&MN
13. Prof. Milosav Ognjanović, S&MN

Forum for Structural Integrity for South-Eastern European Countries

The idea to establish the Forum for Structural Integrity for South-Eastern European Countries

is explained in the Memorandum, accepted by representatives of countries participated in IFMASS 8.

Memorandum

The participants from Balkan and South-East European countries in Eight International Fracture Mechanics Summer School (IFMASS 8), held from 23rd to 27th June 2003, and at the Workshop New Trends in Fracture Mechanics Application, held on 27th June in Belgrade, gathered on the meeting after these events, discussed the achievements in development of fracture mechanics and its application to structural integrity assessment in the region. It is concluded that the organization of IFMASS 8 has shown:

- clear interest of the experts from the region in further development and research in structural integrity assessment;
- wish of all participants to contribute to more close and extended cooperation between the experts in the region;
- the need to find convenient form for exchange of results in achievements in fracture mechanics and structural integrity assessment through better links between the countries in the region, as well as with European Structural Integrity Society (ESIS).

The aim of formal organization, e.g. in the form of Forum for Structural Integrity, can be to put together individuals, institutions and countries, interested in cooperative actions for further development of structural integrity, based on scientific achievements and solutions of failures in service and requirements for equipment life extension. In this way the benefit for all parties involved in such an organization can be reached in the most convenient way. In addition, formal organization can also help in proposing standards and codes of interest for the regional industry, e.g. regarding the safety and reliability of equipments, having in mind also the environment protection. This kind of regional cooperation is broadly accepted and involved in Europe.

In order to prepare the proposal for establishing best form of future regional organization the committee of five members is selected, as follows:

- Representative of Serbia & Montenegro
- Representative of Bulgaria
- Representative of Macedonia
- Representative of Albania
- Representative of Bosnia & Herzegovina

The Committee shall prepare its proposal in next four months (up to November, 1st, 2003), in close contact with ESIS president Prof. Alberto Carpinteri and its office. The experts from the countries, not presented at the meeting, will be also invited to join this action (Croatia, Greece, Hungary).

International Fracture Mechanics Summer School (IFMASS) is considered as one of already established form of future cooperation. It is recommended to organize next School (IFMASS 9) in Bulgaria in 2004, together with Workshop as a satellite event.

The experts, taking part in this meeting, express their wish and readiness to help the committee in its activity and promote the proposal among the experts and institutions in their

countries.

List of participants at the meeting for founding of the Forum

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