

Директору Математичког института САНУ  
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Научном већу Математичког института САНУ  
академику Драгошу Цветковићу

**Стручни извештај о учешћу у**



**The 10th EURODYN 2017 Conference held at the Faculty of Civil and Industrial Engineering of Sapienza University of Rome, Italy, from Sunday 10 to Wednesday 13 September 2017 (see <http://eurodyn2017.it>)**

Поштовани директоре, Професоре Огњановићу,  
Поштовани председниче, Професоре Цветковићу,  
Цењени чланови Научног Већа МИ САНУ,

У периоду од 10 до 14 септембра 2017, боравила сам у Италији, у Риму и учествовала сам у научном програму европске научне конференције из динамике структура и конструкција, под називом:

**The 10th EURODYN 2017 Conference held at the Faculty of Civil and Industrial Engineering of Sapienza University of Rome, Italy, from Sunday 10 to Wednesday 13 September 2017 (see <http://eurodyn2017.it>)**

У организацији Европског научног друштва European Association for Structural Dynamics (EASD- *Gerhard Müller, president of EASD*) и Faculty of Civil and Industrial Engineering of Sapienza University of Rome Italy. Главни организатор **10th EURODYN 2017 Conference** је био професор Фабрицио Вестрони, декан грађевинског факултета Универзитета Ла Сапиенза у Риму, кога познајем скоро две деценије из сусрета на различитим међународним научним скуповима, одржаним ширм света, из нелинеарне динамике.

Серија претходних конференција је одржавана у следећим градовима: **EURODYN Bochum (1990), EURODYN Trondheim (1993), EURODYN Florence (1996), EURODYN Prague (1999), EURODYN Munich (2002), EURODYN Paris (2005), EURODYN Southampton (2008), EURODYN Leuven (2011) and EURODYN Porto (2014)**.

У програму овогодишње конференције у Риму одржано је 26 Mini-symposia, и то са следећим називима:

Biomechanics | Bridge dynamics | Dynamic soil-structure interaction | Dynamical behaviour of materials | Dynamics of coupled systems | Earthquake engineering | Experimental techniques | Fluid structure interaction | Human induced vibrations | Impact dynamics | Inverse problems | Multi-scale dynamics | Nonlinear dynamics | Optimization | Reliability and dynamical systems | Stochastic dynamics | Structural health monitoring | Traffic induced vibrations | Vehicle dynamics | Vibration control | Vibro-acoustics | Wave propagation | Wind engineering.

Ја сам добила позивно писмо од организатора Минисимпозијума 03 - Нелинеарна динамика, професора и познатог научника у овој области Ђузепе Реге (Рим, Италија) и академика Јири Напрстека (Праг, Чешка) да учествујем у научном програму овог минисимпозијума, што сам са задовољством прихватила.

**Концепција садржаја MS03 - Non-linear Dynamics** (J. Naprstek, G. Rega) је следећа:

The scope of the mini-symposium is focused on the new developments in non-linear dynamics of single- and multi-degree of freedom systems as well as of systems with continuously distributed parameters. Papers are welcome of theoretical, experimental and applied nature. The character of the mini-symposium is broad and includes papers of mathematical background, dynamic stability of discrete and continuous systems (smooth/non-smooth), deterministic and random systems subjected to additive/multiplicative excitation or exhibiting self-exciting vibrations. Solutions employing analytical, semi-analytical, or numerical approaches are expected. Experimental studies as verification of theoretical results or primary research at various scales including nano-mechanics are of the particular interest. Especially welcome are papers on recent and ongoing research as well as papers of multi-disciplinary nature. Papers may include investigations of Hamiltonian/non-Hamiltonian, holonomic and non-holonomic systems-interaction, auto-parametric systems, post-critical processes, limit cycles and homo/hetero-clinic orbits, non-linear normal modes, stochastic resonance phenomena, harmonic synchronization, quasi-periodic and other inter-resonance processes, basins of attractors, maps, chaotic behavior, etc. Papers dealing with application in physics and engineering area including case studies and technical development support, interaction with other areas are notably invited for submission. It is expected that both the classical fields of civil and mechanical engineering and the emerging areas of micro and biomechanics will be addressed.

Моје кратко предавање сам одржала под насловом:

**Vibro-impact dynamics of two rolling balls along curvilinear trace**

којим сам приказала четири серије мојих најновијих научних резултата, који стоје у основи овог мог приказа, од чега је у публикованом раду приказана последња серија добијених резултата насловљена насловом рукописа, који је прихваћен за штампу и одштампан у конференцијској публикацији под

**насловом: Procedia Engineering, Volume 199, Pages 1-3588 (2017) , X International Conference on Structural Dynamics, EURODYN 2017**

Edited by Fabrizio Vestroni, Francesco Romeo and Vincenzo Gattu, Elsevier..

Организатори 10th EURODYN 2017 Conference, су публиковали у виду "Hard Copy" Програм конференције на 47 страна, и Book of Abstract на 264 стране A4 формата.

Апстракт мог рада је публикован под следећим библиографским подацима:

Katica R. (Stevanović) Hedrih, *Vibro-impact dynamics of two rolling balls along curvilinear trace*, Book of Abstract, X International Conference on Structural Dynamics, EURODYN 2017, Edited by Fabrizio Vestroni, Francesco Romeo and Vincenzo Gattu, La Sapienza University Rome, Faculty of Civil and Industrial Engineering, PP. 37-38. ISBN 978-88-907854-1-2.

Публиковани рад је са следећим библиографским подацима:

Katica R. (Stevanović) Hedrih, *Vibro-impact dynamics of two rolling balls along curvilinear trace*, Procedia Engineering, X International Conference on Structural Dynamics, EURODYN 2017, Edited by Fabrizio Vestroni, Francesco Romeo and Vincenzo Gattu, Volume 199, Pages 1-3588 (2017) , Elsevier, (2017) pp. 663-668; DOI information: 10.1016/j.proeng.2017.09.120; ISSN: 1877-7058; <https://doi.org/10.1016/j.proeng.2017.09.120>

односно:

Article title: Vibro-impact dynamics of two rolling balls along curvilinear trace

Reference: PROENG396116

Journal title: Procedia Engineering ISSN: 1877-7058

Corresponding author: Dr. Katica R. (Stevanović) Hedrih

First author: Dr. Katica R. (Stevanović) Hedrih

Final version published online: 12-SEP-2017

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DOI information: 10.1016/j.proeng.2017.09.120

У оквиру тог предавања сам изложила моје научне резултате достигнуте по теми истраживања на Пројекту ОН174001 Динамика хибридних система сложених структура. Механика материјала (2011-2017). Моје кратко предавање је добро примљено од слушалаца, мада није било питања после излагања, али у паузама секција је било интересовања за појединачне елементе резултата из динамике вибруударних система и теорије судара.

Задовољна сам ефектом овог мог одржаног кратког предавања, јер сам добила оцене једног броја колега, а и сам субјективни осећај ми даје за право да сам задржала пажњу слушалаца у велкој сали, као и да сам са лакоћом говорила, скоро беседила!

Првог дана конференције EURODYN Roma 2017 предала сам један примерак саплмента, на енглеском језику, првих десет томова Едиције САНУ "Живот и дело

српских научника'' (Life and sciences of Serbian Scientists), једном од организатора Минисимпозијума MS03 - Non-linear Dynamics, професору и истакнутм научнику са University La Sapienza, професору Giuseppe Rega, president of Scientific Committee of International Union of Theoretical and Applied Mechanics (IUTAM). Професор Рега је публикацију примио као дар којим је био изузетно обрадован, а мени је драго да ће публикација придонети ширењу информација о живот и раду српских научника.

Поред одржавања кратког предавања и саопштавања мојих нових научних резултата, учествовала сам питањима и коментарима у односу на неке садржаје кратких, као и секцијских предавања у овом Минисимпозијуму Конференције.

Последњег дана боравка у Риму, имала сам част да будем позвана на вечеру у дому професра Реге са једним бројем истакнутих научника из области нелинеарне динамике, и пријатеља професора Реге. Међу њима су били академик РАН Феликс Черноуско (Русија), академик Јири Напрстек (Чешка), академик Манеевич (Украјина) , професор Алоиз Стеун (Беч, Аустрија), Професор Хагендорф (Немачка), професор Александер Вакакис (САД; са Универзитета Илиноис) и још један професор, кога од раније нисам познавала.

У наставку Извештаја, дат је један број прилога из којих се може видети програмска структура научног програма Конференције.

С поштовањем и захвалношћу директору, председнику Научног већа МИ САНУ, као и члановима Научног већа који су гласли за подршку пројектним активностима пројекта ОН174001 у периоду 2011-2017,

У Београду, 20.09.2017.

Катица (Стевановић) Хедрих

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Проф. др Катица (Стевановић) Хедрих  
Руководилац Пројекта ОИ174001  
Динамика хибридних система сложених структура

## Прилог 1:



Dear Colleague,

The **10th EURODYN 2017 Conference** will be held at the Faculty of Civil and Industrial Engineering of Sapienza University of Rome, Italy, from Sunday 10 to Wednesday 13 September 2017 (see <http://eurodyn2017.it>)

In the framework of the Conference the Mini-Symposium:

### **MS03 – Nonlinear Dynamics**

is organized by:

**Jiri Naprstek**      Institute of Theoretical and Applied Mechanics, Prague, and  
**Giuseppe Rega**      Department of Structural and Geotechnical Engineering, Sapienza University, Rome.

Given your expertise in the area of Nonlinear Dynamics, we cordially invite you to take part in the Mini-Symposium and to present some results of your recent work. Of course, a contribution from one of your co-workers or PhD students is also very welcome.

#### **Mini-Symposium abstract:**

*The Mini-Symposium aims at highlighting/discussing new developments in the nonlinear dynamics of discrete systems as well as of reduced order models of distributed parameter systems. Papers of theoretical, experimental and applied nature are welcome.*

*The character of the Mini-Symposium is broad and includes papers with a meaningful mathematical background, and topics such as dynamic stability of discrete and continuous systems (smooth/non-smooth), deterministic and random systems subjected to additive/multiplicative excitation or exhibiting self-excited vibrations. Solutions employing analytical, semi-analytical, or numerical approaches are expected. Experimental studies as verification of theoretical results or primary research at various scales including micro/nano-mechanics are of particular interest. Especially welcome are papers on recent and ongoing research as well as papers of multi-disciplinary nature. They may include investigations of Hamiltonian/non-Hamiltonian and holonomic/non-holonomic systems, nonlinear interactions, auto-parametric systems, post-critical processes, limit cycles and homo/heteroclinic orbits, nonlinear normal modes, stochastic resonance phenomena, harmonic synchronization, quasi-periodic and other inter-resonance processes, basins of attractors, maps, chaotic behavior, etc.*

*Papers dealing with applications in physics and engineering and including case studies and technical development support, as well as interaction with other areas, are invited for submission. It is expected that both the classical fields of civil and mechanical engineering and the emerging areas of micro and bio-mechanics will be addressed.*

We would be very glad if you would accept this invitation!

Prospective authors are kindly invited to submit Abstracts using the website of the conference:

<https://easychair.org/conferences/?conf=eurodyn2017>

The abstract should include:

1. Title of the paper
2. Authors and affiliation
3. Text of the abstract (200 to 300 words)
4. Keywords, at least three

**The deadline for abstract submission to the MS 03 is July 31, 2016.**

For further information please visit the Conference web page <http://eurodyn2017.it> or contact directly MS03 organizers: [naprstek@itam.cas.cz](mailto:naprstek@itam.cas.cz), [giuseppe.rega@uniroma1.it](mailto:giuseppe.rega@uniroma1.it)

We look forward to receiving your abstracts, your full paper, and then to meeting you in Rome in September 2017.

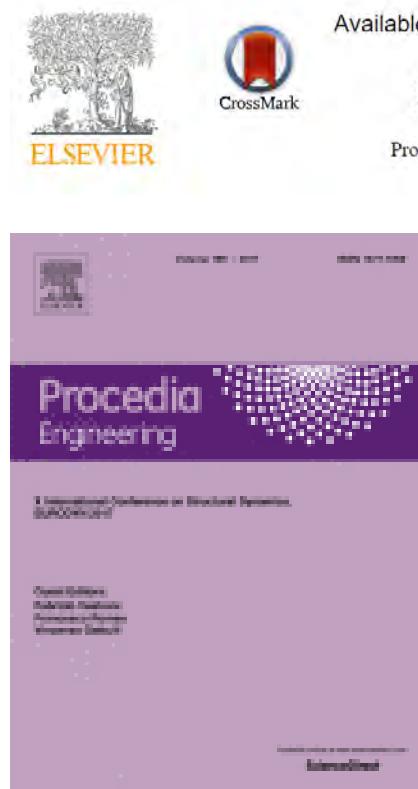
Yours sincerely,

Jiri Naprstek and Giuseppe Rega

\*\*\*\*\*

Katica R. (Stevanović) Hedrih, Vibro-impact dynamics of two rolling balls along curvilinear trace, Procedia Engineering, X International Conference on Structural Dynamics, EURODYN 2017, Edited by Fabrizio Vestroni, Francesco Romeo and Vincenzo Gattu, Volume 199, Pages 1-3588 (2017), Elsevier, (2017) pp. 663-668; DOI information: 10.1016/j.proeng.2017.09.120

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Volume 199, Pages 1-3588 (2017)  
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Edited by Fabrizio Vestroni, Francesco Romeo and Vincenzo  
Gattu

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X International Conference on Structural Dynamics, EURODYN 2017

## Vibro-impact dynamics of two rolling balls along curvilinear trace

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*Faculty of Mechanical Engineering University of Niš, Niš, Serbia*

\*\*\*\*\*

### 4. Concluding remarks

At the end, it is useful to conclude that presented kinetic parameters of dynamics of the central collision of two rolling balls is possible to use in study of the skew collision of two rolling balls that role along two straight as well as curvilinear line trace with intersection as well as parallel at distance smaller than sum of the balls radiiuses.

Aim of this paper is not to present a possibility about generalization of the all results in area of the vibro-impact dynamics in system containing the collision of two rolling balls with different dimension and collisions. The paper is focused to central collision of two rolling rigid and heavy smooth balls and to using elements of mathematical phenomenology and phenomenological mapping to obtain corresponding new expressions for the post-collision and outgoing angular velocity of each ball and to apply these results for investigation of the vibro-impact dynamics of two rolling balls along circle trace. This task is fully analytical solved and obtained analytical results are original and new!

Also, these results can be fundamental for next development and investigation of the special class of vibro-impact dynamical systems with collision of the rigid and/or deformable balls and also in application in different area of engineering systems with coupled rotations (in rolling bearings, rolling vibro-impact dampers - mechanisms for dynamic absorption of torsional vibrations, or other).

### Acknowledgements

Parts of this research were supported by the Ministry of Sciences and Technology of Republic of Serbia through Mathematical Institute SASA, Belgrade Grant ON174001 "Dynamics of hybrid systems with complex structures.", Mechanics of materials and Faculty of Mechanical Engineering University of Niš.

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► Abstract | PDF (375 K)

□ Vibro-impact dynamics of two rolling balls along curvilinear trace Original Research Article  
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Katica R. (Stevanović) Hedrih  
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X International Conference on Structural Dynamics, EURODYN 2017

Preface

Eurodyn 2017 is the Tenth International Conference on Structural Dynamics organised by the European Association for Structural Dynamics and Sapienza University of Rome, at the Faculty of Civil and Industrial Engineering from September 10th to 13th. To have reached its Xth edition is without doubt a significant occasion and worthy of comment. This positive outcome is thanks to the efforts of the EASD and its Presidents: W. Kratzig, H. Grundmann, L. Fryba, G. Muller, and to that of the Chairs of the previous nine Eurodyn conferences:

1990 Bochum, W. Kratzig;  
1993 Trondheim, T. Moan;

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Rome 10 - 13 September

Conference programme

Sapienza University of Rome  
Faculty of Civil and Industrial Engineering



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DIPARTIMENTO DI INGEGNERIA  
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FONDAZIONE  
ROMA SAPIENZA

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Book of Abstracts of EURODYN 2017 - X International Conference on Structural Dynamics  
Rome, Italy, 10-13 September 2017  
F. Vestroni, V. Gattulli, F. Romeo (eds.)

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ISBN: 978-88-907854-1-2  
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Faculty of Civil and Industrial Engineering  
Via Eudossiana 18  
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# Book of Abstracts

**EURODYN  
2017**

**X International  
conference  
on structural  
dynamics**

Rome 10 - 13 September

**Sapienza University of Rome  
Faculty of Civil and Industrial Engineering**



**SAPIENZA**  
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**FONDAZIONE**  
ROMA SAPIENZA



## Certificate of Attendance

This is to certify that

KATICA R STEVANOVIC HEDRIH

has attended the

Eurodyn 2017 - X International Conference on Structural Dynamics

Rome, Italy, 10-13 September 2017

A blue ink signature of the name "Prof. Fabrizio Vestroni".

Prof. Fabrizio Vestroni  
Conference Chair

September 13<sup>th</sup> 2017

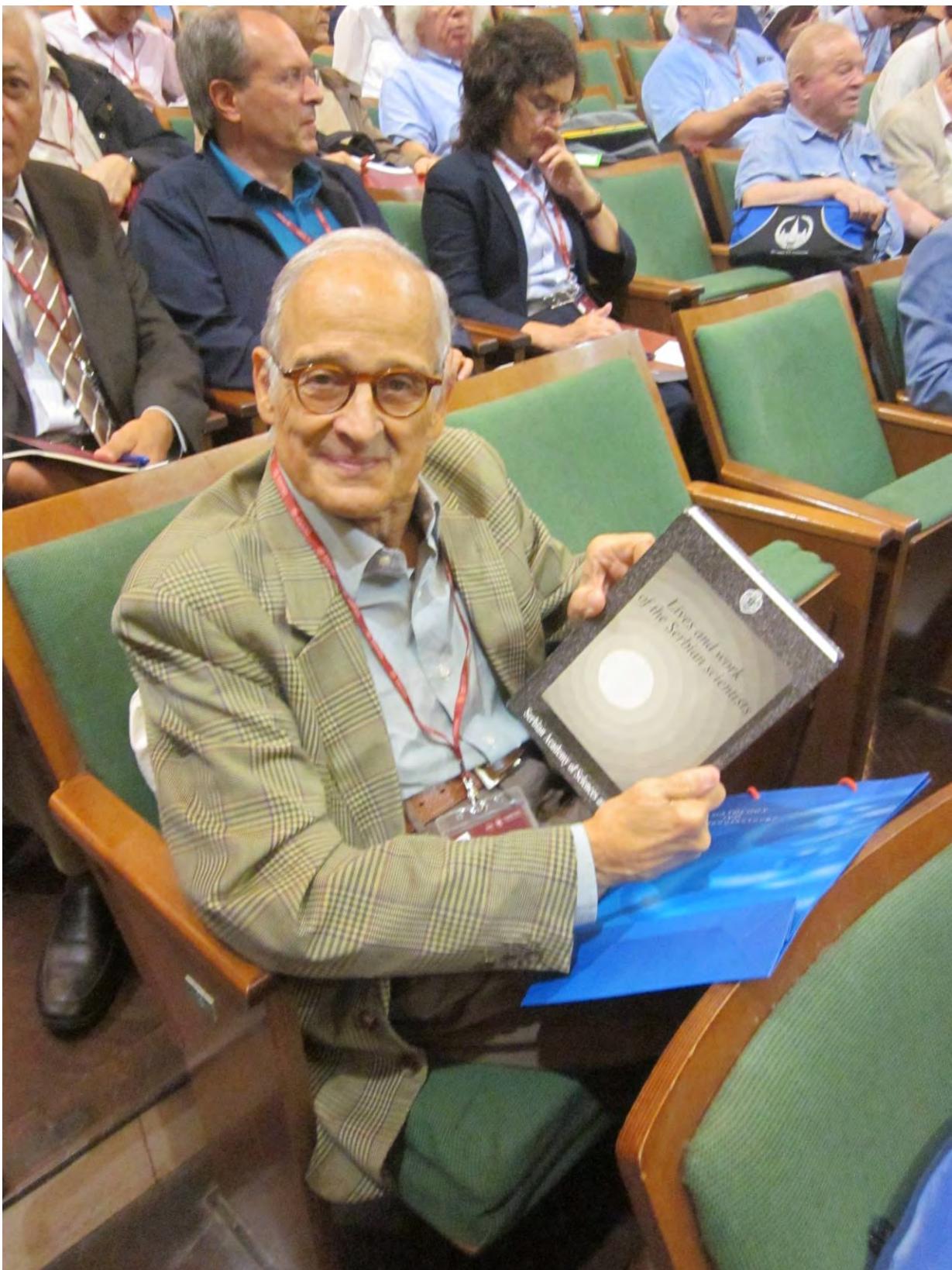












EURODYN Roma 2017, University La Sapienza: Professor Giuseppe Rega, president of Scientific Committee of International Union of Theoretical and Applied Mechanics (IUTAM) with saplement of first ten volume of Edition SASA : Life and sciences of Serbian Scientists.











Dinner party in home of Professor Giuseppe Rega, president of Scientific Committee of International Union of Theoretical and Applied Mechanics (IUTAM)



Excursion to Maastricht 2006, (ENOC Eindhoven 2006)  
Professor Giuseppe Rega and Professor Fabricio Vestoni, from University La Sapienza in Rome

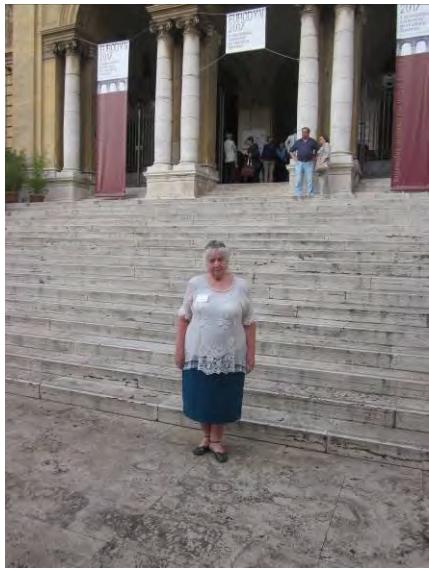


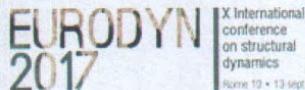
*Participants of*

*The IUTAM Symposium on Chaotic Dynamics and Control of Systems and Processes in Mechanics, 8-13 June 2003, Rome, Department of Structural and Geotechnical Engineering of the University of Roma "la Sapienza", Rome, Italy*



*Participants (In the middle N. S. Namashivaya, D. H. von Campen and F. Vestroni ) of  
The IUTAM Symposium on Chaotic Dynamics and Control of Systems and  
Processes in Mechanics, 8-13 June 2003, Rome, Department of Structural and  
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\* 文部科学省設置認可申請中のため予定であり計画変更もあります。

*"Wind Engineering is best defined as the rational treatment of the interactions between wind in the atmospheric boundary layer and man and his works on the surface of earth"*

Jack E. Cermak (1975)


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