Директору Математичког института САНУ
Проф. др Зорану Огњановићу
Научном већу Математичког института САНУ
академику Драгошу Цветковићу

Стручни извештај

о учешћу у научним скуповима у септембру 2015 године

I*

The 14th International Conference of Tensor Society on Differential Geometry and its Applications, and Informatics. Held at Tsukuba University, Tsukuba, Japan, Sept. 7–12, 2015. Organized by Tensor Society (Tokyo) and University of Tsukuba for mutual Progress.
c/o Kawaguchi Inst. of Math. Soc. Sengen 1-13-33, Tsukuba, Japan.
E-mail: tensor-ns@nifty.ne.jp,kawaguchi_tom@ybb.ne.jp

President of Tensor Society, Prof., Dr. Tomoaki KAWAGUCHI, Tensor Society (Tokyo). c/o Kawaguchi Inst. of Math. Soc. Sengen 1-13-33, Tsukuba, Japan. E-mail: tensor-ns@nifty.ne.jp,kawaguchi_tom@ybb.ne.jp

Моје учешће у раду овог традиционалне међународне конференције диференцијалне геометрије и примена је реализовано следећим активностима:

* Чланством у председништву Конференције на отварању Конференције, а на предлог академика Милеве Првановић и председника Тензор друштва (Tensor Society (Tokyo)) професора Томоаки Кавагучија. Тим предлозима сам била заиста почаствована;
* Председавањем другом пленарном седницом Конференције;
*Учешћем питањима и коментарима на седницама Конференције:
* Чланством у Редакционом одбору часописа TENSOR Јапанског друштва Tensor Society;
* Одржаним 90-томинутним пленарним предавањем по позиву, под насловом:

Katica R. (Stevanović) Hedrih, **Structural, qualitative and mathematical analogies: Theorems of mechanical energy change in dynamics of discrete fractional order system and of a multi-deformable body fractional order system,** Dedicated to 80th Anniversary of Tensor Society President-Professor-Scientist **Tomokai Kawaguchi's** birthday, 90minutes Onvited Plenary Lecture, **The 14th International Conference of Tensor Society on Differential Geometry and its Applications, and Informatics.** Tensor Society (Tokyo) and University of Tsukuba for mutual Progress. Tsukuba, Japan, , Sept. 7–12, 2015., Abstracts, 2015, pp/ 2–3.

После одржаног предавања постављена су ми два питања, на која сам са задовољством одговорила. Кп,шчетам рад ће бити публикован у наредном броју часописа TENSOR Јапанског друштва Tensor Society. Цасопис се публикује вец 75 година!

Организација Конференције је била добра, предавања и саопстења на високом научном нивоу. На овој конференцији је било мање учесника него ранијих година, јер је због економске кризе отсуствовала група истраживача из Румуније, академика Раду Мирона.

Катица (Стевановић) Хедрих

С поштовањем,

У Београду, 25 септембра 2015.

Katica R. (Stevanović) Hedrih
Руководилац пројекта ОМ174001

II*

THE 3rd INTERNATIONAL CONFERE MECHANICAL ENGINEERING IN XXI CENTURY, POCEEDING, September 17 - 18, 2015, NIŠ, Faculty of Mechanical Engineering University of Niš, pp.

У програму ове конференције била су заступљена три моја рада. Два рада су уврштена у регуларни део Конференције, а један је уврштен у део програма, који је посвећен животним јубилејима мојих некадашњих студената, од којих је један бранио докторску дисертацију пред комисијом цији сам члан била на почетку моје универзитетске активности. Тај програм је био под назовом:

MECHATRONICS AND CONTROL, COLLOQUIUM IN HONOUR OF THE 65TH BIRTHDAY OF PROF. NENAD D. PAVLOVIĆ AND PROF. TOMISLAV PETROVIĆ

Сва три моја рада су публикована у Конференцијском Зборнику, рецензираних радова. Списак тих публикованих радаова са библиографским подацима је у прилогу:

Katica (Stevanović) HEDRIH, Elements of Geometry, Kinematics and Dynamics of Billiards, MECHATRONICS AND CONTROL, COLLOQUIUM IN HONOUR OF THE 65TH BIRTHDAY OF PROF. NENAD D. PAVLOVIĆ AND PROF. TOMISLAV PETROVIĆ, THE 3rd INTERNATIONAL CONFERE MECHANICAL ENGINEERING IN XXI CENTURY, POCEEDING, September 17 - 18, 2015, NIŠ, Faculty of Mechanical Engineering University of Niš, pp. 313-318. Hard Copy ISBN 978-86-6055-072-1 and CD.

Katica R. (STEVANOVIĆ) HEDRIH, Velocities of the Basic Vectors of a Tangent Space Of Moving Mass Particle Vector Position In Curvilinear Coordinate Systems, THEORETICAL AND APPLIED MECHANICS AND MATHEMATICS, THE 3rd INTERNATIONAL CONFERE MECHANICAL ENGINEERING IN XXI CENTURY, POCEEDING, September 17 - 18, 2015, NIŠ, Faculty of Mechanical Engineering University of Niš, pp. 449-454.Hard Copy ISBN 978-86-6055-072-1 and CD.

Katica R. (STEVANOVIĆ) HEDRIH, The Fractional Order System Oscillations: Analytical Theory and Examples, THEORETICAL AND APPLIED MECHANICS AND MATHEMATICS, THE 3rd INTERNATIONAL CONFERE MECHANICAL ENGINEERING IN XXI CENTURY, POCEEDING, September 17 - 18, 2015, NIŠ, Faculty of Mechanical Engineering University of Niš, pp. 455-460. Hard Copy ISBN 978-86-6055-072-1 and CD.

С поштовањем,

У Београду, 25 септембра 2015.

Katica R. (Stevanović) Hedrih
Руководилац пројекта OM174001

III*

XIII КОНФЕРЕНЦИЈА
ДИГИТАЛИЗАЦИЈА КУЛТУРНЕ БАШТИНЕ И ДИГИТАЛНА ХУМАНИСТИКА
(национални скуп са међународним учешћем)

Београд, 10 - 11. септембар 2015

XIII konferencija Digitalziacija kulturne bastine i digitalna humanistika, Beograd, 10. i 11. 9. 2015.

За ову конференцију пријавила сма три саопћтења:

Катица Р. (Стевановић) Хедрих,

1* Татомир Анђелић, Данило Расковић и тензорски рачун у Србији

2* Одељење за механику и Семинар механике Математичког института САНУ у периоду новембар 2010-август 2011 године

3* Пола века Катедре за механику Масинског факултета Универзитета у Нишу.

Због подударности термина боравка у Јапану, послала сам Организаторима два постера за прво саопсштење, и ПДФ фајл за друго саопштење уз комплетиран текст за постављање у базу електронске библиотеке. Наравно све то уз извињење што лично већу учествовати.
Треће саопћтење сам одложила за следећу конференцију да тада исто саопћтим-.

С поштовањем,

Катица (Стевановић) Хедрих

У Београду, 25 септембра 2015.

Katica R. (Stevanović) Hedrih
Руководилац пројекта ОМ174001

T E N S O R S O C I E T Y
c/o Kawaguchi Institute of Mathematical Sciences
Sengen 1-13-33, Tsukuba, 305-0047 Tsukuba, Japan
Tel. 81-(0)29-851-5615, Fax 81-(0)29-856-6576
E-mail: tensor-ns@nifty.ne.jp kawaguchi_tom@ybb.ne.jp

President: Prof. Tomoaki KAWAGUCHI, Dr. of Eng.

Academician、Professor, Dr. Katica R. (Stevanovi_c) Hedrih
Mathematical Institute Serbian Academy of Science and Arts, Belgrade
(and Faculty of Mechanical Engineering University of Nis)
ul. Vojvode Tankosi_ca 3/22, 18000 Ni_s, Serbia
E-mail: khedrih@eunet.rs, katica@masfrak.ni.ac.rs, khedrih@sbb.rs

Tsukuba, May11, 2015

Dear Academician, Professor, Dr. Katica R. (Stevanovic),

On behalf of Tensor Society, we would like to invite you with our great pleasure to "The 14th International Conference of Tensor Society on the Differential Geometry and its Applications, Sept. 7-12, 2015 held" at University of Tsukuba, Tsukuba, Japan, and it is very happy for us if you could present and talk some scientific activities in your special fields.

Looking forward to hearing from you concerning the above matter at your earliest convenience,

Sincerely yours

Professor, Dr. Tomoaki KAWAGUCHI
Tomoaki Kawaguchi
President of Tensor Society

テ ン ソ ル 学 会

TENSOR

Edited by

Tomoaki KAWAGUCHI

With the cooperation of

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Tensor Society

筑波大学
University of Tsukuba

The 14th INTERNATIONAL CONFERENCE OF TENSOR SOCIETY DIFFERENTIAL GEOMETRY AND ITS APPLICATIONS, AND INFORMATICS BESIDES

— Joint Conference of Tensor Society and University of Tsukuba —

held at University of Tsukuba, Tsukuba, Japan, Sept. 7-12, 2015

<The First Announcement>

Location : International conference room, University of Tsukuba

Organizing committee :

Honorary President : Shoji WATANABE (Tokyo)

President : Tomoaki KAWAGUCHI (Tokyo)

Local President : Mika SATO (Tsukuba)

Vice President : Hiroaki KAWAGUCHI (Chigasaki)

Members : Shun-ichi AMARI (Tokyo), Hiroshi ENDO (Tokyo),
Shigeru IGARASHI (Tsukuba), Toyoko KASHIWADA (Tokyo),
Akemi KAWAGUCHI (Tsukuba), Koji MATSUMOTO (Yamagata)
Tetsuya MIZUTANI (Tsukuba), Masaru SHIMBO (Sapporo).

The conference covers various research fields as follows :

1. Riemannian geometry and its Applications,
2. Finslerian geometry, its Applications and Higher order geometry,
3. Information geometry and its Applications,
4. Electromagnetics and Relativity,
5. Informatics,
6. Miscellaneous subject

Participation fees :

1. **US $ 200.00 for a member of Tensor Society**
   (for Japanese people : ¥20,000)
2. **US $ 50.00 for an accompanied person by a member**
   (for Japanese people : ¥5,000)
3. **US $ 250.00 for a non-member of Tensor Society**
   (for Japanese people : ¥25,000)
4. **US $ 75.00 for an accompanied person by a non-member**
   (for Japanese people : ¥7,500)

Accommodation and Meals :

We can offer that every foreigner and Japanese member of the society stay at University hotel at a resonable price. The cost and its item will be notified by the second information given at the end of May, 2015.

Correspondences:

Dr. Tomoaki KAWAGUCHI
Tensor Society (Tsukuba)
c/o Kawaguchi Inst.of Math.Sci.
Sengen 1-13-33, Tsukuba, Japan
E-mail: tensor-ns@nifty.ne.jp
Tel: 81-(0)29-851-5615 (Tsukuba)
Fax: 81-(0)29-856-6576
Tel/Fax: 81-(0)3-3947-3910 (Tokyo)
Mobile: 81-090-9150-4681

Dr. Hiroaki KAWAGUCHI
Tensor Society (Chigasaki)
c/o Kawaguchi Inst.of Math.Sci.
Matsu-ga-oka 2-7-15, Chigasaki, Japan
E-mail: tensorsociety@ybb.ne.jp
Tel: 81-(0)467-83-3914 (Chigasaki)
Fax: 81-(0)467-86-4713
Tel/Fax: 81-(0)44-954-0427
Mobile: 81-090-9953-9533

THE 14th INTERNATIONAL CONFERENCE OF TENSOR SOCIETUY

Organized by Tensor Society and University of Tsukuba for mutual Progress,

Held at Tsukuba, Japan, Sept. 7-12, 2015

PROGRAM

テンゾル学会

(TENSOR SOCIETY)

THE 14th INTERNATIONAL CONFERENCE OF TENSOR SOCIETUY

Program

September 8 (Tuesday), 2015

10:00～10:15 Opening Ceremony

Chairwoman: Prof. Mileva PRVANOVIC (Serbian Academy, Belgrade)

10:15～10:45 Lecture by Takayoshi Ootsuka.

Title: A definition of Finsler connection from the point-Finsler viewpoint.

10:45～11:15 Lecture by Takayoshi Ootsuka, Ryoko Yahagi, Muneyuki Ishida and Erico Tanaka.

Title: Energy-momentum conservation laws in Finsler / Kawaguchi Lagrangian formulation.

11:15～11:30 Coffee break.

11:30～12:00 Lecture by Erico Tanaka, Takayoshi Ootsuka, Ryoko Yahagi and Muneyuki Ishida.

Title: Relativity and Energy momentum currents by the framework of Kawaguchi geometry.

12:00～13:30 Lunch time.

Chairwoman: Prof. Katica R. (Stevanovic) HEDRIH (Serbian Academy, Belgrade)

13:30～14:00 Lecture by Tetsuya Nagano.

Title: Linear parallel displacement and the torsion tensor field P.

14:00～14:30 Lecture by Tadashi Aikou and Haripamyu.

Title: An example of Rizza-negative structures.

14:30～17:00 Free speech.

September 9 (Wednesday), 2015

Chairman: Prof. Koji MATSUMOTO (Yamagata)

10:00～10:30 Lecture by Masaru Shimbo, Jun Toyama and Masashi Shimbo.

Title: The Origin of the Flash Lag Illusion in the Non-Riemannian Multisensory System.

10:30～12:00 Lecture by Katica R. (Stevanovic) Hedrih.

Title: Structural, qualitative and mathematical analogies: Theorems of Mechanical energy change in dynamical system of discrete fractional order and in a multi-deformable body fractional order system.

12:00～13:30 Lunch time.

September 10 (Thursday), 2015

Chairman: Prof. Tadashi AIKOU (Kagoshima)

10:00～11:00 Lecture by Mileva Prvanovic.

Title: Some properties of locally decomposable Riemannian manifold and Kaehler manifolds of generalized quasi constant curvature.

11:00～11:30 Lecture by Koji Matsumoto

Title: Some curvaturelike Field of an almost Contact Riemannian Manifold.

11:30～13:30 Lunch time.

Chairman: Prof. Tetsuya Nagano (Nagasaki)

13:30～14:00 Lecture by Toyoko KASHIWADA

Title: A generalized Hops manifold admitting a certain symmetric property.

14:00～14:30 Lecture by Zerrin Senturk.

Title: On curvature properties of locally conformal Kaehler space forms.

14:30～15:00 Coffee break.

THE 14th INTERNATIONAL CONFERENCE OF TENSOR SOCIETUY

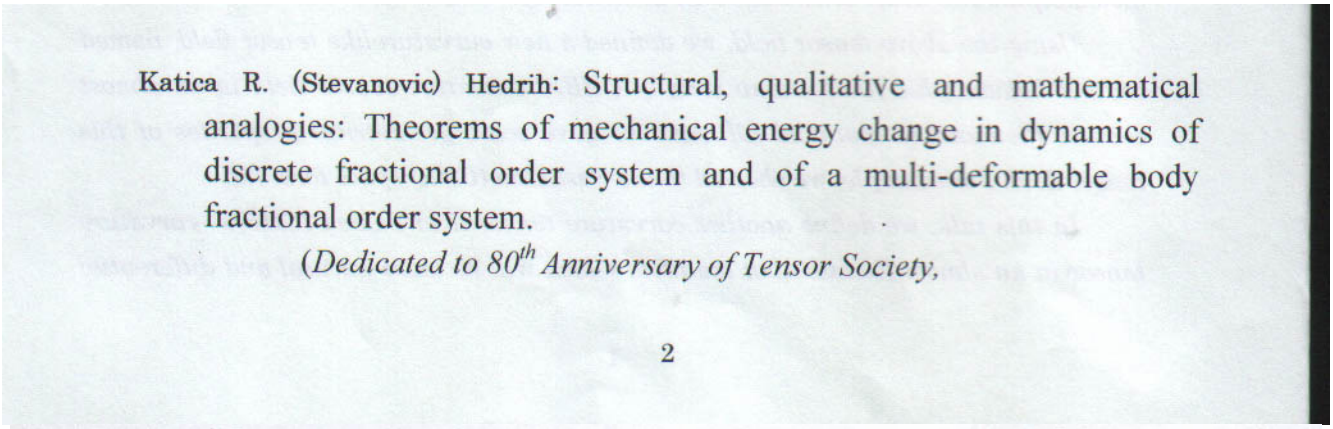
Organized by Tensor Society and University of Tsukuba for mutual Progress,

Held at Tsukuba, Japan, Sept. 7-12, 2015

ABSTRACT

テンゾル学会

(TENSOR SOCIETY)


Katica R. (Stevanovic) Hedrih: Structural, qualitative and mathematical analogies: Theorems of mechanical energy change in dynamics of discrete fractional order system and of a multi-deformable body fractional order system.

(*Dedicated to 80th Anniversary of Tensor Society,*

2

President-Professor-Scientist Society,

A series of theorems of mechanical energy change in dynamics of discrete fractional order system and of a multi-deformable body fractional order system are defined with corresponding proofs. Using structural, qualitative and mathematical analogies between mechanical chain system and electruical chain system the theorems of total mechanical energy change in mechanical fractional order system are presented as analogous with the theorems of total electrical energy change in electrical fractional order system.

Structural, qualitative and mathematical analogies: Theorems of mechanical energy change in dynamics of discrete fractional order system and of a multi-deformable body fractional order system

Dedicated to 80th Anniversary of
Tensor Society President-Professor-Scientist **Tomokai Kawaguchi's** birthday

Katica R. (Stevanović) Hedrih,
Mathematical Institute SANU Belgrade, Department for Mechanics and Faculty of Mechanical Engineering, University of Niš, Serbia.
Priv. address: 18000-Niš, ul Vojvode Tankosića 3/22, Serbia, e-mail: khedrih@eunet.rs, khedrih@sbb.rs .

ABSTRACT. A series of theorems of mechanical energy change in dynamics of discrete fractional order system and of a multi-deformable body fractional order system are defined with corresponding proofs. Using structural, qualitative and mathematical analogies between mechanical chain system and electruical chain system the theorems of total mechanical energy change in mechanical fractional order system are presented as analogous with the theorems of total electrical energy change in electrical fractional order system.

Some of theorems for discrete fractional order system dynamics are:

Theorem 1: For a class of fractional order no conservative system dynamic, with n degrees of freedom, and defined by: matrix of inertia properties $\mathbf{A}=\left(a_{kj}\right)_{\rightarrow\ j=1,2,3,\ldots,n}^{\downarrow\ k=1,2,3,\ldots,n}$, matrix of rigidity properties $\mathbf{C}=\left(c_{kj}\right)_{\rightarrow\ j=1,2,3,\ldots,n}^{\downarrow\ k=1,2,3,\ldots,n}$, matrix of viscoelastic creep fractional order properties $\mathbf{C}_{\alpha}=\left(c_{\partial,kj}\right)_{\rightarrow\ j=1,2,3,\ldots,n}^{\downarrow\ k=1,2,3,\ldots,n}$ and matrix of viscoic linear properties $\mathbf{B}=\left(b_{kj}\right)_{\rightarrow\ j=1,2,3,\ldots,n}^{\downarrow\ k=1,2,3,\ldots,n}$, rate of fractional order system total mechanical

energy $\mathbf{E}=\mathbf{E}_{\mathbf{k}}+\mathbf{E}_{p}$ degradation is equal to negative sum of double Rayleigh function 2Φ and matrix product between velocity $(\dot{x})$ and first partial derivative $\frac{\partial \mathbf{P}_{\alpha}}{\partial\left(\mathfrak{D}_{\mathbf{t}}^{\alpha}\{x\}\right)}$ of generalized function of fractional order energy dissipation with respect to fractional order derivative $\mathfrak{D}_{\mathbf{t}}^{\alpha}\{x\}$.

$$\frac{d\mathbf{E}}{dt}=-2\Phi-\sum_{k=1}^{k=n}\sum_{j=1}^{j=n}\dot{x}_{k}\frac{\partial \mathbf{P}_{\alpha}}{\partial\left(\mathfrak{D}_{\mathbf{t}}^{\alpha}[x_{j}]\right)},\quad for\quad \alpha\neq 0 \text{ and } 0<\alpha\leq 1 \tag{1}$$

For system with one degree of freedom previous relation (10) take the following form:

$$\frac{d\left\langle E_{kinet}+E_{pot}\right\rangle}{dt}=-2\Phi(\dot{u})+Q_{frac}\left(\mathfrak{D}_{\mathbf{t}}^{\alpha}[u]\right)\dot{u} \qquad 0<\alpha\leq 1 \tag{2}$$

or

$$\frac{d\mathbf{E}}{dt}=-2\Phi(\dot{u})-\frac{\partial \mathbf{P}\left(\mathfrak{D}_{\mathbf{t}}^{\alpha}[u]\right)}{\partial\left\langle\mathfrak{D}_{\mathbf{t}}^{\alpha}[u]\right\rangle}\dot{u}=-b\dot{u}^{2}-b_{\alpha}\mathfrak{D}_{\mathbf{t}}^{\alpha}[u]\dot{u} \qquad 0<\alpha\leq 1 \tag{3}$$

Theorem 2: For a class of fractional order no conservative system dynamic, with n degrees of freedom, and defined by: matrix of inertia properties $\mathbf{A}=\left(a_{kj}\right)_{\rightarrow\ j=1,2,3,...,n}^{\downarrow\ k=1,2,3,...,n}$, matrix of rigidity properties $\mathbf{C}=\left(c_{kj}\right)_{\rightarrow\ j=1,2,3,...,n}^{\downarrow\ k=1,2,3,...,n}$, matrix of viscoelastic creep fractional order properties $\mathbf{C}_{\alpha}=\left(c_{\partial,kj}\right)_{\rightarrow\ j=1,2,3,...,n}^{\downarrow\ k=1,2,3,...,n}$ and matrix of viscoic linear properties $\mathbf{B}=\left(b_{kj}\right)_{\rightarrow\ j=1,2,3,...,n}^{\downarrow\ k=1,2,3,...,n}$, with properties that both side product by modal matrix $\mathbf{R}=\left(\left\{K_{nk}^{s}\right\}\right)=\left(K_{nk}^{s}\right)_{\rightarrow\ s=1,2,3,...,n}^{\downarrow\ k=1,2,3,...,n}$ of corresponding linear system produce all system matrix in diagonal form: $\mathfrak{A}=\mathbf{R}'\mathbf{A}\mathbf{R}=diag\left(\tilde{a}_{ss}\right)$, $\mathfrak{C}=\mathbf{R}'\mathbf{C}\mathbf{R}=diag\left(\tilde{c}_{ss}\right)$, $\mathfrak{B}=\mathbf{R}'\mathbf{B}\mathbf{R}=diag\left(\tilde{b}_{ss}\right)$, $\mathfrak{C}_{\alpha}=\mathbf{R}'\mathbf{C}_{\alpha}\mathbf{R}=diag\left(\tilde{c}_{(\alpha)ss}\right)$,

then rate of each system independent eigen main fractional order mode total mechanical energy $\mathbf{E}_{s}=\mathbf{E}_{kin,s}+\mathbf{E}_{pot,s}$ degradation is equal to negative sum of double Rayleigh function $2\Phi_{s}$ and matrix product between velocity $\dot{\xi}_{s}$ and first partial derivative $\frac{\partial \mathbf{P}_{\alpha}}{\partial\left(\mathfrak{D}_{\mathbf{t}}^{\alpha}[\xi_{s}]\right)}$ of generalized function of fractional order energy dissipation with respect to fractional order derivative $\mathfrak{D}_{\mathbf{t}}^{\alpha}[\xi_{s}]$:

$$\frac{d\mathbf{E}_{s}}{dt}=-2\Phi_{s}-\dot{\xi}_{ss}\frac{\partial \mathbf{P}_{\alpha}}{\partial\left(\mathfrak{D}_{\mathbf{t}}^{\alpha}[\xi_{s}]\right)},\qquad for\quad \alpha\neq 0,0<\alpha<1,s=1,2,3...,n, \tag{4}$$

or in the form:

$$\frac{d\mathbf{E}_{s}}{dt}=-2\Phi_{s}-\tilde{c}_{\alpha,ss}\dot{\xi}_{s}\mathfrak{D}_{\mathbf{t}}^{\alpha}[\xi_{s}],\qquad for\quad \alpha\neq 0,0<\alpha\leq 1,\quad s=1,2,3,...,n \tag{5}$$

Hybrid system contains multi deformable bodies (beams, plates or membranes), same boundary conditions, coupled by discrete continuum layers. Discrete continuum layers are built by standard elastic and inertia properties and fractional order elements homogeneously distributed between each of two adjacent deformable bodies. During the dynamics of deformable bodies in transversal direction each of standard elastic, and inertia, and fractional order elements obtain extension or compression equal to difference between two displacements of the corresponding body points for which are coupled its ends: $\Delta w_{k+1,k}(x,y,t)=w_{k+1}(x,y,t)-w_{k}(x,y,t)$ for plates and membranes, and $\Delta w_{k+1,k}(x,t)=w_{k+1}(x,t)-w_{k}(x,t)$ for beams and belts. Energy analysis of dynamics of definrd multi-deformable body system with elastic, and translator ind rotator inertia properties, and fractional order discrete continuum layers is presented. Sries of theorems are defined and proofed. One of theorem is:

Theorem 3. Generalized forces $Q_{w_k}^{elem-sloja}$ and $Q_{w_{k+1}}^{elem-sloja}$ of interaction between two deformable bodies coupled by standard discrete continuum layer with known kinetic $\mathbf{E}_k^{elem-sloja}$ and potential $\mathbf{E}_p^{elem-sloja}$ energies and known Rayleigh function of energy dissipation $\Phi^{elem-sloja}$ and generalized function of fractional order element energy dissipation in the form:

$\Phi_{0<\alpha<1}^{element-layer}=\frac{1}{2}c_{0<\alpha<1(k,k+1)}\left\{\mathfrak{D}_t^{\alpha}[w_{k+1}(x,y,t)-w_k(x,y,t)]\right\}^2$, where where $\mathfrak{D}_t^{\alpha}[\bullet]$ is fractional order differential operator of the α^{th} derivative with respect to time t in the following form: $\mathfrak{D}_t^{\alpha}[\bullet]=\frac{d^{\alpha}[\bullet]}{dt^{\alpha}}=\frac{1}{\Gamma(1-\alpha)}\frac{d}{dt}\int_0^t\frac{[\bullet]}{(t-\tau)^{\alpha}}d\tau$

$\Gamma(1-\alpha)$ is Euler Gama function, $c_{\alpha(k,k+1)}$ are rigidity coefficients expressing fractional order dissipation properties, and α a rational number between 0 and 1, $0<\alpha<1$, expressing dissipation properties of standard fractional order element, for generalized coordinates $w_k(x,y,t)$ and $w_{k+1}(x,y,t)$ displacement of deformable bodies at the point of contacts with discrete continuum elastic, inertia and fractionaL order layer are in the following forms:

$$Q_{w_k}^{elem-layer}=-\left\langle\frac{d}{dt}\frac{\partial\mathbf{E}_k^{elem-layer}}{\partial\left(\frac{\partial w_k(x,y,t)}{\partial t}\right)}-\frac{\partial\mathbf{E}_k^{elem-layer}}{\partial w_k(x,y,t)}\right\rangle-\frac{\partial\mathbf{E}_p^{elem-layer}}{\partial w_k(x,y,t)}-\frac{\partial\Phi^{elem-layer}}{\partial\left(\frac{\partial w_k(x,y,t)}{\partial t}\right)}-\frac{\partial\Phi_{0<\alpha<1}^{element-layer}}{\partial\left(\mathfrak{D}_t^{\alpha}[w_k(x,y,t)]\right)}=Q_{w_k(x,y,t)}^{elem-def.bodya} \quad (6)$$

$$Q_{w_{k-1}}^{elem-layer}=-\left\langle\frac{d}{dt}\frac{\partial\mathbf{E}_k^{elem-layer}}{\partial\left(\frac{\partial w_{k-1}(x,y,t)}{\partial t}\right)}-\frac{\partial\mathbf{E}_k^{elem-layer}}{\partial w_{k-1}(x,y,t)}\right\rangle-\frac{\partial\mathbf{E}_p^{elem-layer}}{\partial w_{k-1}(x,y,t)}-\frac{\partial\Phi^{elem-layer}}{\partial\left(\frac{\partial w_{k-1}(x,y,t)}{\partial t}\right)}-\frac{\partial\Phi_{0<\alpha<1}^{element-layer}}{\partial\left(\mathfrak{D}_t^{\alpha}[w_{k-1}(x,y,t)]\right)}=Q_{w_{k-1}(x,y,t)}^{elem-def.bodya}$$

expressed by energies and energy dissipation which posses discrete continuum layer.

Other theprems are related to the change: * of total mechanical energy of one eigen amplitude mode and generalized function of fractional order energy dissipation; * of a total mechanical energy of a eigen time mode of eihrn time function correspond to one eigen amplitude mode. Transiet of enegy between defrmable bodies in the hybrid system is analyzed.

Ttheorem 4. Change of total mechanicale energy of the multy bory fractional order system dynamics is equal to the power of dissipative forces and fractional order dissipative forces work along corresponding system displacements:

$$\frac{d\left(\mathbf{E}_{\mathbf{k},bidies}+\mathbf{E}_{\mathbf{p},bodies}\right)}{dt}+\frac{d\left(\mathbf{E}_{\mathbf{k},layers}+\mathbf{E}_{\mathbf{p},layers}\right)}{dt}=$$
$$=-2\Phi_{layers}-\sum_{\substack{k=1\\w_4(x,y,t)=0}}^{3}\frac{\partial\Phi_{0<\alpha\le1}\left(\mathfrak{D}_t^{\alpha}[w_{k+1}(x,y,t)-w_k(x,y,t)]\right)}{\partial\left(\mathfrak{D}_t^{\alpha}[w_{k+1}(x,y,t)-w_k(x,y,t)]\right)}\left(\dot{w}_{k+1}(x,y,t)-\dot{w}_k(x,y,t)\right) \quad (7)$$

Where

$$\mathbf{P}_{(0<\alpha<1)k,k+1}=\frac{\partial\Phi_{0<\alpha\le1}\left(\mathfrak{D}_t^{\alpha}[w_{k+1}(x,y,t)-w_k(x,y,t)]\right)}{\partial\left(\mathfrak{D}_t^{\alpha}[w_{k+1}(x,y,t)-w_k(x,y,t)]\right)}\left(\dot{w}_{k+1}(x,y,t)-\dot{w}_k(x,y,t)\right) \quad (8)$$

power of fractional order dissipative forces of a discrete continuum layer between two deformable bodies (plates,, or membranes, or beams) and along displacements of upper $w_k(x,y,t)$ and lower $w_{k+1}(x,y,t)$ body (plate or membrane); and $\mathfrak{D}_t^{\alpha}[\bullet]$ is fractional order differential operator of the α^{th} derivative with respect to time t in the following form[4-11]:

$$\mathfrak{D}_t^{\alpha}[\bullet]=\frac{d^{\alpha}[\bullet]}{dt^{\alpha}}=\frac{1}{\Gamma(1-\alpha)}\frac{d}{dt}\int_0^t\frac{[\bullet]}{(t-\tau)^{\alpha}}d\tau \quad (9)$$

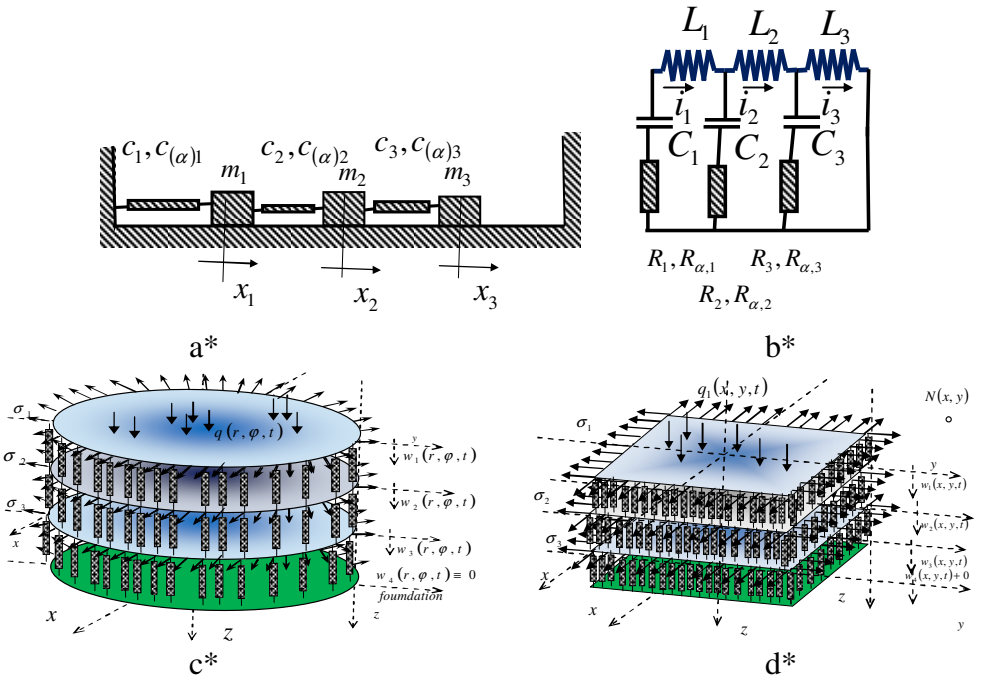


Figure1. Qualitative and mathematical analogous fractional order chains: a* mechanical fractional order chain system and b* electrical fractional order chain syste as well as ; c* multi circular membrane and d* multi rectangular membrane system on the fractional order discrete continuum fundation.

Table 1. Qualitative and mathematical analogous fractional order system energies: a* mechanical fractional order system and b* electrical fractional order system

	Kinetic energy	Potential energy	Generalized function of fracrional order energy dissipation	Energy relations in frational order system
a*	For mass particles $2\mathbf{E}_k = (\dot{x})\mathbf{A}\{\dot{x}\}$ $2\mathbf{E}_k = \sum_{s=1}^{s=n} \dot{\eta}_s^2$ $\eta_s,\ s = 1,2,3,\ldots,n$ eigen normal coordinates (modes) of displacements	For linear elastic springs $2\mathbf{E}_p = (x)C\{x\}$ $2\mathbf{E}_p = \sum_{s=1}^{s=n} \omega_s^2 \eta_s^2$	Power of fractional order dissipative forces in standard fractional order elements $2\mathbf{P}_{\alpha\neq 0} = (\mathfrak{D}_t^{\alpha}\{x\})C_{\alpha}\{\mathfrak{D}_t^{\alpha}\{x\}\},$ $for \quad \alpha \neq 0, 0 < \alpha < 1$ $2\mathbf{P}_{\alpha} = \sum_{s=1}^{s=n} \omega_{(\alpha),s}^2 (\mathfrak{D}_t^{\alpha}[\eta_s])^2$ $for \quad \alpha \neq 0, 0 < \alpha < 1$	System total mechanical energy rate $\frac{d\mathbf{E}}{dt} = -2\Phi - \sum_{k=1}^{k=n}\sum_{j=1}^{j=n} \dot{x}_k \frac{\partial \mathbf{P}_{\alpha}}{\partial(\mathfrak{D}_t^{\alpha}[x_j])},$ $for \quad \alpha \neq 0, 0 < \alpha < 1$ Eigen main fractional order independent mode total mechanical energy rate $\frac{d\mathbf{E}_s}{dt} = -2\Phi_s - \dot{\xi}_{ss} \frac{\partial \mathbf{P}_{\alpha}}{\partial(\mathfrak{D}_t^{\alpha}[\xi_s])},$ $for \quad \alpha \neq 0, 0 < \alpha < 1, s = 1,2,3\ldots,n$
b*	For inductors $2\mathbf{E}_k = (\dot{q})\mathbf{L}\{\dot{q}\}$ $2\mathbf{E}_k = \sum_{s=1}^{s=n} \dot{\eta}_s^2$ $\eta_s, s = 1,2,3,\ldots,n$ eigen normal coordinates (modes) of electricity	For linear capacitors $2\mathbf{E}_p = (q)\mathbf{C}^*\{q\}$ $2\mathbf{E}_p = \sum_{s=1}^{s=n} \omega_s^2 \eta_s^2$	Power of fractional order dissipative electrical voltage in standard fractional order resistors $2\mathbf{P}_{\alpha\neq 0} = (\mathfrak{D}_t^{\alpha}\{q\})\mathbf{R}_{\alpha}\{\mathfrak{D}_t^{\alpha}\{q\}\},$ $for \quad \alpha \neq 0, 0 < \alpha < 1$ $2\mathbf{P}_{\alpha} = \sum_{s=1}^{s=n} \omega_{(\alpha),s}^2 (\mathfrak{D}_t^{\alpha}[\eta_s])^2$ $for \quad \alpha \neq 0, 0 < \alpha < 1$	System total electrical energy rate $\frac{d\mathbf{E}}{dt} = -2\Phi - \sum_{k=1}^{k=n}\sum_{j=1}^{j=n} \dot{x}_k \frac{\partial \mathbf{P}_{\alpha}}{\partial(\mathfrak{D}_t^{\alpha}[x_j])},$ $for \quad \alpha \neq 0, 0 < \alpha < 1$ Eigen main fractional order independent mode total electrical energy rate $\frac{d\mathbf{E}_s}{dt} = -2\Phi_s - \dot{\xi}_{ss} \frac{\partial \mathbf{P}_{\alpha}}{\partial(\mathfrak{D}_t^{\alpha}[\xi_s])},$ $for \quad \alpha \neq 0, 0 < \alpha < 1, s = 1,2,3\ldots,n$

$\Gamma(1-\alpha)$ is Euler Gama function, and $c_{0(k,k+1)}$ and $c_{\alpha(k,k+1)}$ are rigidity coefficients – momentary (expressing ideal elastic properties) and prolonged one (expressing fractional order dissipation properties), and α a rational number between 0 and 1, $0 < \alpha < 1$, expressing elastic and dissipation properties of standard fractional order element. $\tilde{\Phi}_{0<\alpha<1} = \frac{1}{2} c_{0<\alpha<1(k,k+1)} \{\mathfrak{D}_t^{\alpha}[w_{k+1}(x,y,t) - w_k(x,y,t)]\}^2$ generalized function of fractional order discrete continuum layer energy dissipation for $0 < \alpha \leq 1$.

Acknowledgement. *Parts of this research were supported by the Ministry of Sciences of Republic Serbia trough Mathematical Institute SANU Belgrade Grants OI 174001" Dynamics of hybrid systems with complex structures. Mechanics of materials", Faculty of Mechanical Engineering University of Niš.*

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THE 14th INTERNATIONAL CONFERENCE OF TENSOR SOCIETY ON DIFFERENTIAL GEOMETRY AND ITS APPLICATIONS, AND INFORMATICS BESIDES
Organized by Tensor Society and University of Tsukuba for mutual Progress,
Held at Tsukuba, on Japan, Sept. 7-12, 2015


Linear parallel displacement and the
torsion tensor field P
Tetsuya NAGANO
hnagano@sun.ac.jp
University of Nagasaki
International Conference of Tensor Society
Sept. 7-12, 2015
University of Tsukuba, Tsukuba, Japan)


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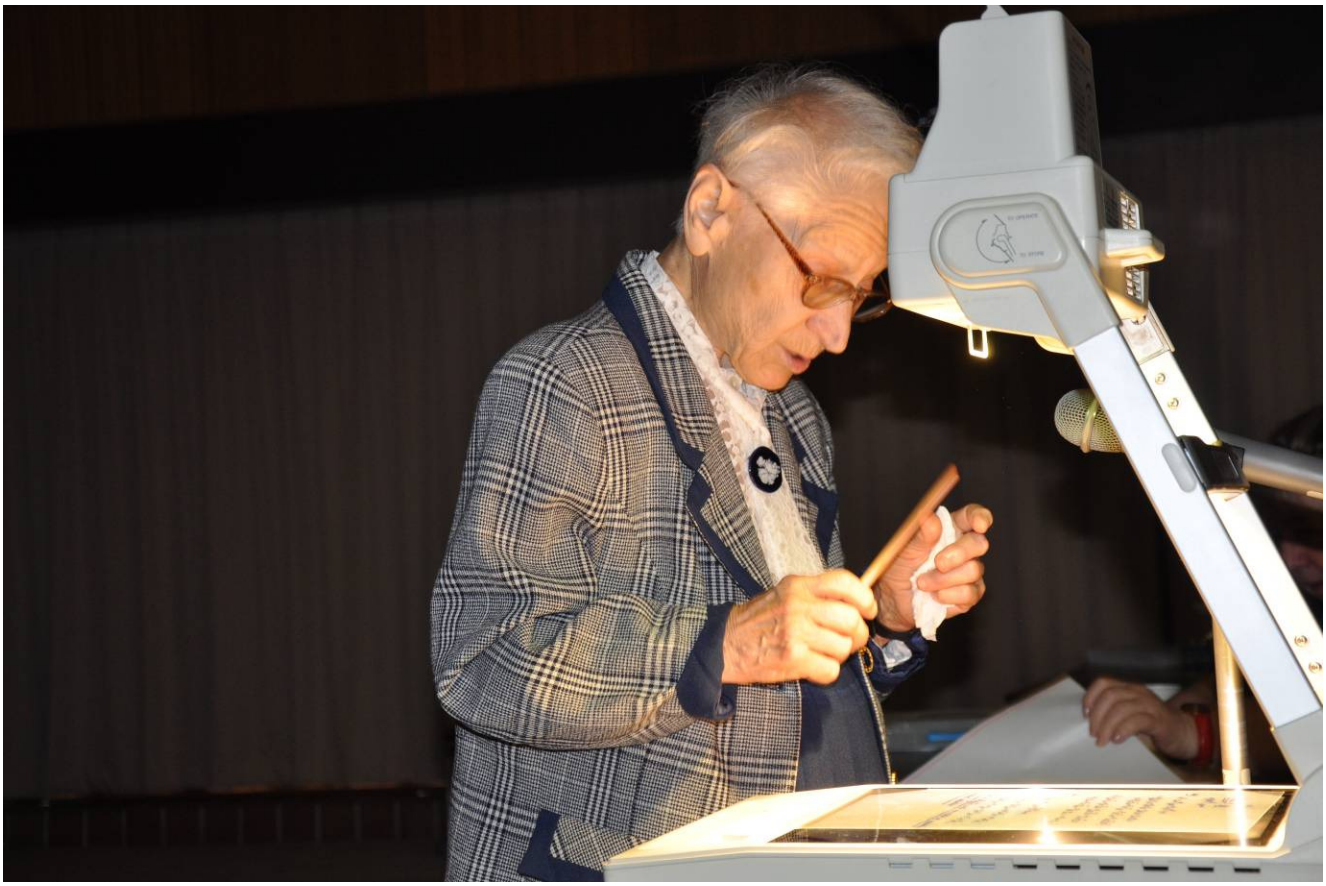


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DATE: 28 JULY 2015

HEDRIH/KATICA MRS

FLIGHT **JU 310 - AIR SERBIA** SUN 06 SEPTEMBER 2015

DEPARTURE: **BELGRADE, RS (NIKOLA TESLA), TERMINAL 2** **06 SEP 06:40**
ARRIVAL: **PARIS, FR (CHARLES DE GAULLE), TERMINAL 2D -** **06 SEP 09:15**
AEROGARE 2 TERMINAL D
FLIGHT BOOKING REF: JU/YI4J62 LAST CHECK IN TIME: 05:55
RESERVATION CONFIRMED, ECONOMY (L) DURATION: 02:35

- -

BAGGAGE ALLOWANCE: 1PC
SEAT: **05B CONFIRMED FOR HEDRIH/KATICA MRS**
MEAL: MEAL
WHEELCHAIR-FOR RAMP CONFIRMED
NON STOP BELGRADE TO PARIS
OPERATED BY: AIR SERBIA, JU
EQUIPMENT: AIRBUS INDUSTRIE A320-100/200

FLIGHT **AF 272 - AIR FRANCE** SUN 06 SEPTEMBER 2015

DEPARTURE: **PARIS, FR (CHARLES DE GAULLE), TERMINAL 2E** - **06 SEP 11:05**
AEROGARE 2 TERMINAL E
ARRIVAL: **TOKYO, JP (TOKYO INTL HANEDA), TERMINAL I** - **07 SEP 06:00**
INTERNATIONAL TERMINAL
FLIGHT BOOKING REF: AF/YI4J62 LAST CHECK IN TIME: 10:05
RESERVATION CONFIRMED, ECONOMY (T) DURATION: 11:55

- -

BAGGAGE ALLOWANCE: 1PC
SEAT: **38K CONFIRMED FOR HEDRIH/KATICA MRS**
MEAL: SNACK/MEAL
WHEELCHAIR-FOR RAMP CONFIRMED
NON STOP PARIS TO TOKYO
OPERATED BY: AIR FRANCE, AF
EQUIPMENT: BOEING 777-200/200ER

FLIGHT **AZ 787 - ALITALIA S.A.I. S.P.A.** SUN 20 SEPTEMBER 2015

DEPARTURE: **TOKYO, JP (NARITA INTL), TERMINAL 1** **20 SEP 13:00**
ARRIVAL: **MILAN, IT (MALPENSA), TERMINAL 1** **20 SEP 18:30**
FLIGHT BOOKING REF: AZ/MXR7SR
RESERVATION CONFIRMED, ECONOMY (X) DURATION: 12:30

- -

BAGGAGE ALLOWANCE: 2PC
SEAT: **23K CONFIRMED FOR HEDRIH/KATICA MRS**
WHEELCHAIR-FOR RAMP CONFIRMED
NON STOP TOKYO TO MILAN
OPERATED BY: ALITALIA S.A.I. S.P.A., AZ
EQUIPMENT: BOEING 777-200/200ER

FLIGHT **AZ 7076 - ALITALIA** S.A.I. S.P.A. SUN 20 SEPTEMBER 2015

DEPARTURE: **MILAN, IT (MALPENSA), TERMINAL 1** **20 SEP 20:55**
ARRIVAL: **BELGRADE, RS (NIKOLA TESLA)** **20 SEP 22:35**
FLIGHT BOOKING REF: AZ/MXR7SR
RESERVATION CONFIRMED, ECONOMY (X) DURATION: 01:40

- -

BAGGAGE ALLOWANCE: 2PC
WHEELCHAIR-FOR RAMP CONFIRMED

NON STOP MILAN TO BELGRADE
OPERATED BY: AIR SERBIA, JU 545
EQUIPMENT: AIRBUS INDUSTRIE A319

FLIGHT TICKET(S)

TICKET: **AF/ETKT 057 9340299346-47 FOR HEDRIH/KATICA MRS**

GENERAL INFORMATION

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https://www.checkmytrip.com/CMTServlet?R=YI4J62&L=US&N=HEDRIH

T. Kawaguchi<tensor-ns@nifty.ne.jp>;

From: T. Kawaguchi
Sent: Monday, August 31, 2015 11:50 PM
To: Katica Hedrih
Cc: T. Kawaguchi
Subject: Re: Address in Japan

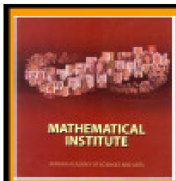
Tsukuba, Sept. 1, 2015

Dear Professors Hedrih and Prvanovic,
Thank you for your kind message. I and my wife Akemi are good health.
In Tokyo, we have arranged that you with your grand daughter and Mrs. Prvanovic together will stay in my apartment at Tokyo:
Komagome 1-3-5-302, Toshima-ku, Tokyo.
Tel. 81- 03-3947-3910, Mobil Phone: 090-9150-4681 (Tomoaki), 090-8486-7413 (Akemi),
81 means Japanese country code, 03 means Tokyo code.
My apartment is not so large, but it is in center of Tokyo, and very near Komagome Station (JR rail way, Yamanote line).
During conference, you can put big laggage etc.

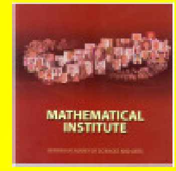
In Tsukuba, we also arranged Guest House of Univ. of Tsukuba,
Room No. 407, for Mrs. Prvanovic, Tel. 029-853-8707 (direct),
Room No. 408(twin), for you and Grand daughter, Tel. 029-853-8708 (direct)
Room No. 406 (twin), for I and my brother, Tel. 029-853-8706 (direct).

On 7th Sept., my wife Akemi will pick up you and Prof. Prvanovic at Tokyo Haneda airport, after then will go to my apartment. After some rest there, evening, **Prof. H. Endo and Prof. T. Kashiwada** will guide and accompany all member to Univ. of Tsukuba.
All member: Prof. Prvanovic, Prof. Hedrih and Miss Mihaela, Dr. Zerrin Senturk.

Looking forward to seeing soon, Sincerely yours,
Tomoaki KAWAGUCHI and Akemi KAWAGUCHI

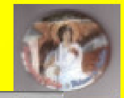


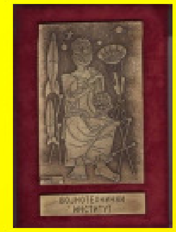
Tensor Calculus in Yugoslavia and Serbia: Academicina Tatomir P. Andjelić (1903-1993) and Prof. Dr. Ing. Dipl. Math. Danilo P. RAŠKOVIĆ (1910-1985)

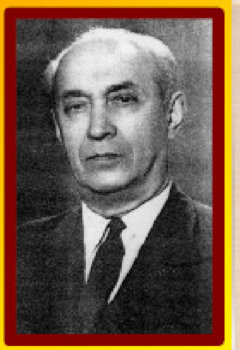


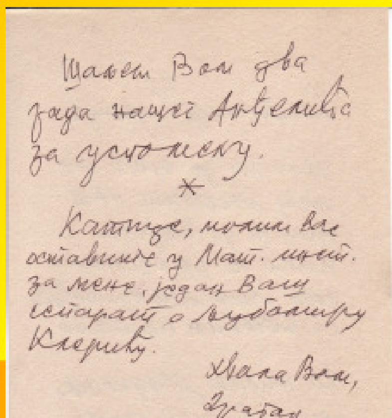
Hedrih (Stevanović) R. Katica

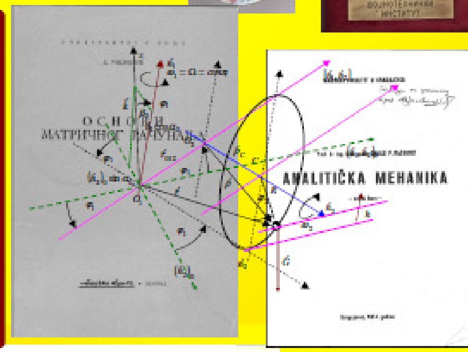
Mathematical Institute SANU Belgrade,
and Faulty of Mechanical Engineering University of Niš, Serbia

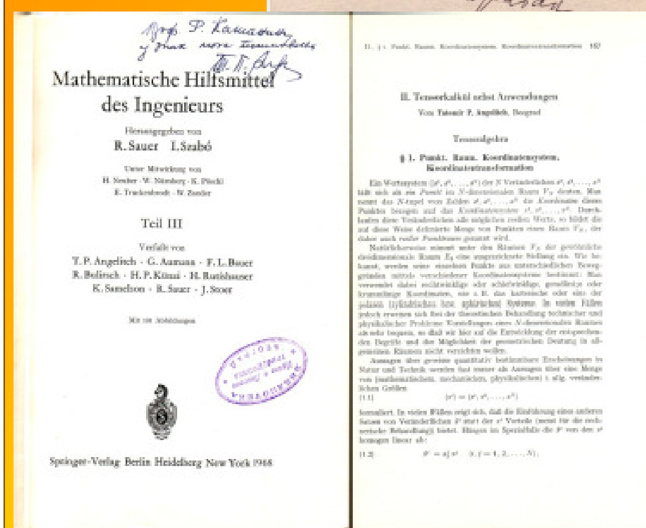


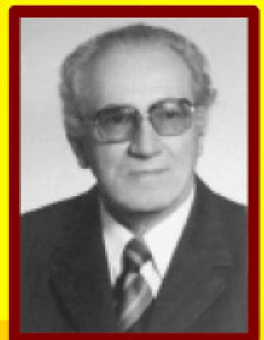












Beograd, 20.X.1984.

Draga Katice,

Hvala Vam na poslatoj kopiji prihvatanja recenzije kolega recenzenata. Taj akt i onaj prethodni kopirao sam i priložiću rukopisu, kako traži "Naučna knjiga". Sada su oni mnogo zauzeti spremanjem za sajam knjiga, pa ćemo pregled rukopisa i sve što ide uz to ostaviti za početak novembra. Dao sam crteže ing. Vidiću, pa će i oni biti verovatno gotovi.

Kada sam bio kod "Naučne knjige " uspeo sam da od njih dobijem jedan primerak "Zbirke zadataka" /iz njihove biblioteke/. Tako smo sredili i tu stvar da Vas ne mučim više , niti da molite Milku u moje ime. Priznajem da sam Vas mnogo nagnjavio sa ovim poslovima, ali šta ćete , Vi ste mi jedina uzdanica i pomoć. Još jednom veliko Vam hvala.

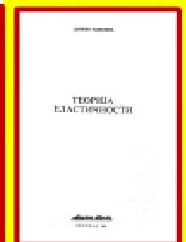
Kako ste Vi? Imate li mnogo posla? Sigurno, da imate , škola je takva, nikad mira. Kako je gospodin? Vlatimir je već veliki momak . Poljubite ga.

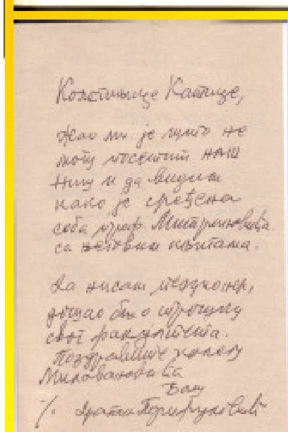
Primite mnogo pozdrava od moje supruge.

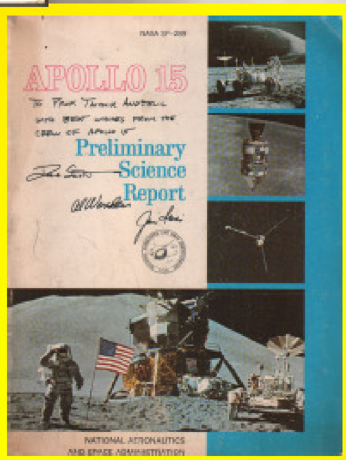
Uz zahvalnost , mnogo, mnogo toplih pozdrava

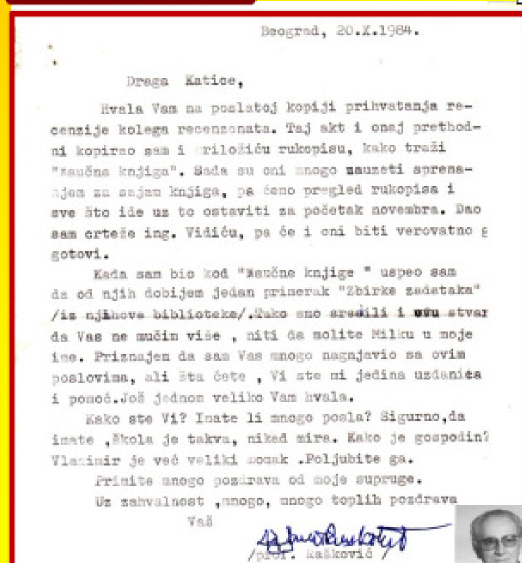
Vaš

/prof. Rašković









Beograd, 16.08.'84

Draga Katice,

Juče sam bio kod "Naučne knjige", pre nisam mogao, jer su bili na odmoru. Iako su kolege Anđelić i Brčić bili vrlo agilni, referat /recenzija/ je morao da čeka. Kao što vidite recenzija je perfektna. Rukopis se mnogo sviđa kolegi Brčiću. Prof. Anđelića nisam video , bio je malo bolestan. Sada je sve u redu.

"Naučna knjiga" je zadržala rukopis radi detaljnog pregleda i voljna je da ga štampa u 2000 primeraka /uobičajeni ekonomsko opravdani tiraž/. Litografisanje ne dolazi u obzir zbog vrlo komplikovanog teksta i nerentabilnosti.

Oni smatraju

1. da MF u Nišu treba da plati honorar recenzentima,
2. da pisac preda crteže u tušu na pausu ili hameru radi kliširanja,
3. da novčana pomoć MF iz Niša može da se ostvari na dva načina
   a/ dodeljivanjem NKnjizi bezprovratne sume novca radi snanjena prodajne cene knjige,
   b/ zagarantovanog otkupa izvesne količine knjiga .

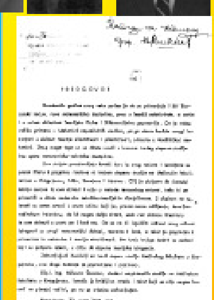
Oni će da izvrše kalkulaciju , pa mole da ih MF izvesti . Obaveštenje je najbolje poslati NK.

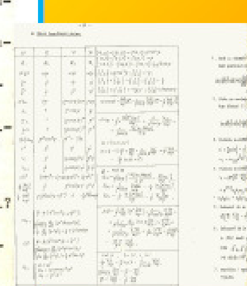
Kako ste Vi i Vaši? Jeste li se dobro odmorili? Mnogi se hvale kako im je bilo dobro u Grčkoj.

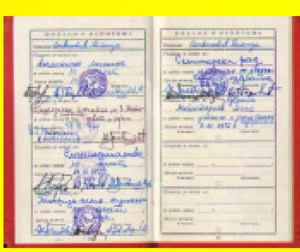
Žurim i izvinjavam se za eventualne greške. Želim da pošaljem dokumenta.

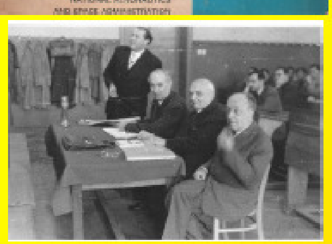
Srdačan pozdrav

/prof. Rašković/









13th SEEDI Conference, Belgrade, 10-11th September 2015

Tensor Calculus

Academicina Tatomir P. Andjelić (1903-1993) ,

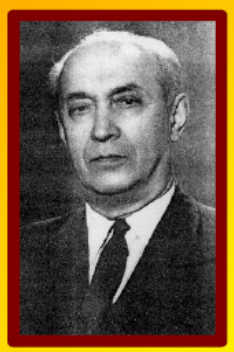
Professor Dr. Akitsugu Kawaguchi (1972- 1902) and

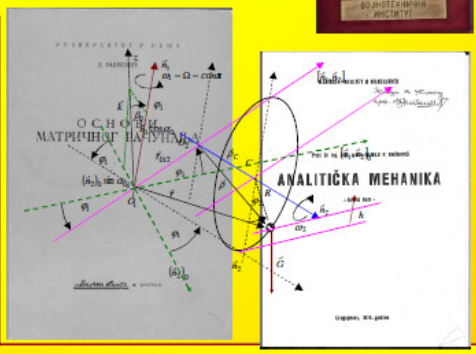
Prof. Dr. Ing. Dipl. Math. Danilo P. RAŠKOVIĆ (1910-1985)

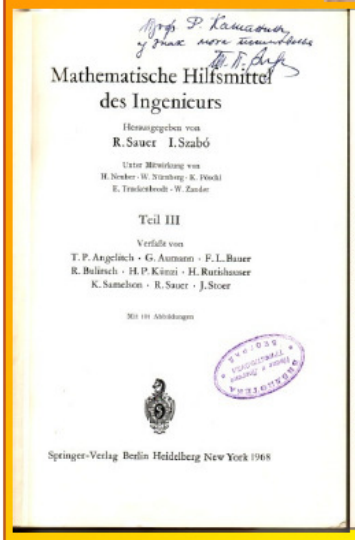
Hedrih (Stevanović) R. Katica

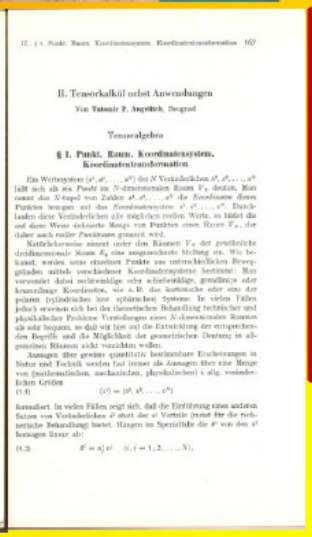
Mathematical Institute SANU Belgrade,

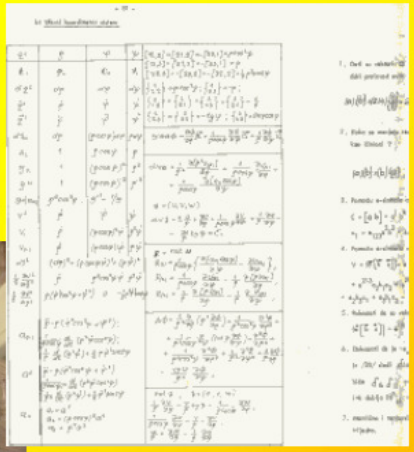
and Faulty of Mechanical Engineering University of Niš, Serbia

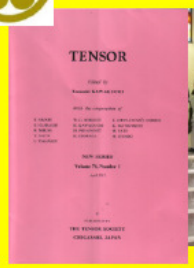


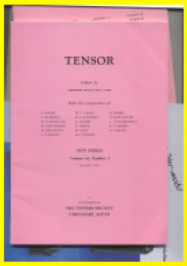












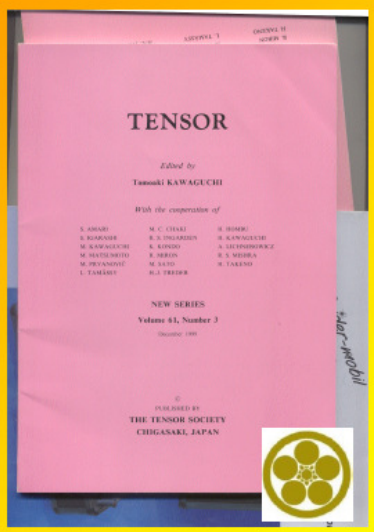
Tensor Society Conference, Tokyo, 7-12th September 2015

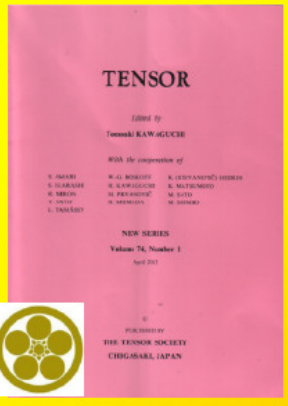
Mathematical Institute SANU

Tensor Society and Journal Tensor
Professor Dr. Tomoaki Kawaguchi,
President of Tensor Society and Edito-in-Chief

Hedrih (Stevanović) R. Katica

Mathematical Institute SANU Belgrade,
and Faulty of Mechanical Engineering University of Niš, Serbia





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