

Project

Date: 18.01.2018.

Project Title: Dynamics of hybrid systems with complex structures.
Mechanics of materials.

Project Number: 174001

Project Leader: Катица Хедрих (Стевановић)

Research Coordinate Organisation: Mathematical Institute SANU

Research Participate Organisations: Mathematical Institute SANU, Mechanical Engineering Faculty University of Belgrade, Mechanical Engineering Faculty University of Nis, Mathematical Faculty University of Belgrade, Faculty of technical sciences Kosovska Mitrovica University of Pristine, Faculty of technical sciences Bor University of Belgrade, Faculty of Engineering sciences University of Kragujevac, Faculty of technology Leskovac University of Nis, Innovative Center of Mechanical Engineering Faculty University of Belgrade, Innovative Center of Electro-technical Engineering Faculty University of Belgrade, Institute Kirilo Savic, State University of Novi Pazar

Total number of person months: 217

Number of Ph.D.'s for 2011-2017: 14

Number of graduated Ph.D.'s for 2011-2017: 10

Report on Research conducted between 2011-2017

Planned research goals: In the documentation of the accepted project for the period 2011 -2015, the abstract of the project, as well as the special plans for each of the individual years, 8 basic topics for research were formulated. And, in the period 2016-2017, the same topics for research were retained, as they represented well-designed and fundamental and current fields of Theoretical and applied mechanics. Formulated topics are of interest to members of the research team, comprised of experienced researchers, as well as to the formation of competent researchers from at the start 10 young PhD students, on average 25 years of age and without research experience. When composing topics, the competences of researchers in scientific and university teaching and scientific titles, as well as the possibility of team and individual research within defined topics, were taking into account in order to realize the freedom and autonomy of creativity, according to the choice and achievement of authentic author results and experienced researchers, as well as young Ph.D. students, who are still in formation. The first and main task, which the project leader had set them was to acquire wider scientific knowledge of Theoretical and Applied Mechanics and to pass all mandatory exams defined with the program of

doctoral studies, edited and published at least one first one-author work, and then concentrated on one of the research topics and, within the framework of the project, achieve the results for the formulation of their doctoral dissertations, in consultation with appointed mentors from the respective faculties. Formulated research themes, accepted by Project Proposal ON174001 The dynamics of hybrid systems, complex structures, and next annual plans are: 1 * Analytical mechanics of discrete systems of fractional order. The dynamics of the rheonomic, nonholonomic and rheological systems. 2 * Nonlinear and rare phenomena in the dynamics of hybrid systems of coupled rigid and deformable bodies. Transmission of energy through the system. Synchronization of subsystems of hybrid systems. 3 * Models of biological oscillators and phenomena of dynamics and transmission of signals, information and energy through their complex structures. 4 * Mechanics of discrete models of continuum - Theory and application. Dynamics of homogeneous structures of coupled deformable bodies and standard elements of constituent relations based on linear, elongated, non-linear, viscoelastic and / or hereditary properties and / or fractional order properties. Nonlocal theory. 5 * The dynamics of the systems with friction, the discontinuities of the properties of the kinetic parameters. Vibro-impact systems with friction. 6 * Elements of mathematical phenomenology and application (in mechanics, in nonlinear dynamics, as well as the integration of scientific knowledge and the reduction of dynamical systems models. 7 * Fracture dynamics and material damage by the method of discrete continuum. 8 * Control of Dynamics and Hybrid Systems

Key words in project application were: Hybrid, nonlinear, discrete continuum, stability, vibro-impact, control. At the end of the research period 2011-2017, the number of keyword research topics by subject was increased. So, Key words and plan and contents of research on our project in 2017, as well as in previous years of research are: Hybrid systems, nonlinear dynamics, non-holonomic systems, phenomenology and analogies, fractional order systems, nonlinear transformations, rheonomic systems, mass moment vectors, discrete continuum, nonlocal theory, approximation, phase trajectories and phase portraits, energy surfaces, stochastic oscillations, stability, Theory of collision between bodies in rolling, vibro-impact, energy analysis, biomechanical oscillators, dynamics of machines, fracture mechanics, control.

Achieved research goals with short description:

New and original results were obtained, on the basis of which the contents of certain references, which were entered into the electronic database. This report outlines only a number of research results. Contributions and new knowledge have been created: 1 * in Analytical mechanics: 1.a * By establishing the original basis of the unique theory of analytic mechanics of discrete systems of fractional order; 1.b * Original contributions to the dynamics of systems with non-holonomic constraints. A PhD was defended. 2 * on non-linear and rare phenomena in the dynamics of hybrid systems of rigid as well as coupled deformable bodies. D.Eqs. of the first approximation by amplitudes and phases of the multi-frequency modes of nonlinear oscillations were derived, and interaction of nonlinear modes and the appearance of energy transfer between modes, as well as the corresponding number of resonant jumps, are tested by a numerical experiment. The application of the mass moment vectors to the dynamics of gyro-rotors with coupled rotations is shown. Defended two PhDs. 3 * Mathematical description

of models and processes of biological oscillators were established and phenomena of dynamics, as well as transmission of signals and energy through their complex structures. Oscillatory models of the mouse zona pelucida, mitotic spindle, and the double DNA chains with elastic, visco-elastic and fractional type properties are set. A Ph.D. was defended. The young researcher received European Mechanics Society award at the ENOC Rome 2011 for the mechanical oscillatory model of mouse zona pelucida, and have a lecture on the IUTAM ICTAM Beijing 2014 world congress. 4 * on the mechanics of discrete-continuous models of the continuum, and the structure of coupled deformable bodies and standard elements of constituent relations based on linear-elastic, nonlinear-elastic, visco-elastic and / or hereditary properties and / or fractional order properties, as well as the application of the non-local theory at the level of the nano system. Two Doctorates were defended. One of the PhD students published a monograph. 5 * on the phenomena of system dynamics with friction and discontinuities of kinetic parameters. A methodology for studying the dynamics of vibro-impact systems from the body collision in translator motion along the curvilinear pathways is developed. A Ph.D. was defended. A monograph was published. 6 * by expanding the classical theory of collision with kinematics and the dynamics of body collision in rolling. A hypothesis has been introduced on the conservation of sum of angular momentum for axles of body rolling, the defined coefficient of restitution of rolling bodies in collision by angular rolling velocities, and derived analytical expressions for outgoing angular velocities of rolling the body after collision. The methodology for studying the dynamics of vibro-impact systems with generalized rolling pendulums along the curvilinear paths was set, using the phase-portrait method. A significant number of papers were published, one of category M21a and a large number of plenary lectures and presentations were held at international and world congresses, as well as a public lecture at the SANU branch in Nis. 7 * modeling the dynamics of the system with elements of gears and identifying the phenomenon of nonlinear dynamics in engineering systems. 8 * models of fracture mechanics and material damage. Published a monograph. 9 * The theory of control of the system with time delay. Defended (Completed) two Ph.D. Several monographs of national significance. 10 * robot dynamics. A Ph.D. was defended. The topics of research, formulated at the start, in the seven-year period proved to be significant from theoretical-scientific aspect, but also from the aspect of application in engineering practice, as well as the necessity for improving the university study programs at technical faculties.

Planned activities and results:

The planned activities are: 1 * Engaged young PhD students-researchers gain knowledge and qualify for active research on the project. Therefore, a two-year seminar for young PhD students -researchers titled: "Methods of Mechanics in Application" was planned and organized by project leader Prof. Dr. Katica (Stevanović) Hedrih who within this seminar held lectures from various fields of Theoretical and Applied Mechanics. It is planned to be a supplement to the the knowledge of PhD students in the fields of Theoretical and Applied Mechanics, pointing to ideas for research within the planned topics. The first and main task, which the project leader had set them was to acquire wider scientific knowledge of Theoretical and Applied Mechanics, to pass all the mandatory programs of doctoral studies, publish at least

one first one-author work, and then concentrate on one of the themes of the project and in the course of it, achieve the results for the assertion of their own in doctoral dissertations, in consultation with appointed mentors from relevant faculties. 2 * All researchers, especially those in scientific titles, to formulate their author's authentic or team results in individual topics of the project in manuscripts and verify them by publishing in leading scientific or domestic journals. It is strictly forbidden to enroll in the coauthors of researchers who did not contribute to the research result, which is the premise of the contents of the manuscript of the article. 3 * To edit a special number of Elsevier's Journal of International Journal on Non-Linear Mechanics, which will be devoted to Mihail Petrovich's Theory "Elements of Mathematical Phenomenology and Phenomenological Mapping", with the work of researchers from the project and works of scientists from abroad with whom researchers cooperate. 4 * Each of the researchers will show individual or team results at European, world, and local scientific meetings. * Some researchers, whose work is accepted in a very strict selection, took part in the work of one of the world congresses of Theoretical and Applied Mechanics ICTAM organized by the International Union of Theoretical and Applied Mechanics of IUTAM, held every four years. b * The researchers attend and present their scientific results at Mechanics Seminars, as well as other Seminars of Mathematics, at the Mathematical Institute of the SASA. v * The researchers participate in the series of European Non-Linear Oscillations ENOC, as the ESMC solid body mechanics conference organized by the European Society of Mechanics, which is held every three years. g * The researchers take part in the series of the Congress of the Serbian Society of Mechanics, which is held every second year, as well as organize the mini-events: Nonlinear Dynamics. d * Researchers participate as members of scientific committees of international scientific conferences, meetings and congresses. 5 * The team of the project organizes 2012, common with the Scientific Society of Serbia, an international symposium of Nonlinear dynamics with the support of the project in the field of physical chemistry. To edit one special issue of the journal Scientific Review of the Scientific Society of Serbia with the works of the participants. 6 * The project organizes a series of one-day mini-symposiums on specific topics of the project in MI SASA, but also in cooperation with other National projects or bilateral projects China-Serbia (with Faculty of Mechanical Engineering in Belgrade). 7 * To arrange two special issues of Theoretical and Applied Mechanics-TAM of the Serbian Society of Mechanics, one dedicated to one of the founders of the Mathematical Institute of SASA, Anton Bilimović, while the second one is dedicated to the Address to Mechanics, and contains mainly the papers of researchers from the project; 8 * Participation of researchers in Editorial Boards of Scientific Journals or in the position of reviewers for journals and - or scientific mee

Achieved activities and results:

1 * Ten (10) researchers have defended their PhDs, one is in the PhD level evaluating, and two are working for PhDs research, and one is in the phase of exams, since it is subsequently included in the project. 2 * The project leader, as well as the Head of the Department of Mechanics of MI SASA at that time, successfully organized and held, in 2011 and 2012, a large number of lectures within the seminar "Mathematical Methods of Mechanics in Application" (<http://www.mi.sanu.ac.rs/colloquiums/>)

program.htm). 3 * A special number of Elsevier's International Journal on Non-Linear Mechanics, dedicated to Mihail Petrovich's Theory "Elements of Mathematical Phenomenology and Phenomenological Mapping", was prepared with the work of researchers from the project and the works of scientists from abroad. 4 *a* Works of two researchers were accepted in a very rigorous selection, and they participated in two world congresses Theoretical and applied mechanics The 23rd ICTAM Beijing 2012 and The 24th ICTAM Montreal 2016 (www.ICTAM2016.org) in the organization of The International Union of Theoretical and Applied Mechanics of IUTAM, held every four years. These are truly remarkable successes of these researchers and a significant contribution to the reputation and promotion of the project and MI SASA worldwide. b* The researchers in the period 2011-2017 actively participated with the original lectures in the work of the Seminars of Mechanics and Mathematics at MI SASA. v* Researchers participated in the European Non-Linear Oscillations Conferences ENOC Rome 2011, ENOC Vienna 2014 and ENOC Budapest 2017, as well as ESMC Graz 2011 solid body mechanics, organized by the European Society of Mechanics, which held every three years. At these meetings, we were recognized as a unique team of young researchers with the project leader, who chaired the individual sections, and one young researcher who received one of two awards for young researchers at the EuroMech Soc. Award during ENOC Rome 2011. g* The researchers participated in four congresses of the Serbian Society of Mechanics, held in Vlasina 2011, in Vrnjacka Banja 2013, Arandjelovac 2015 and Tara 2017. The project Leader organized four Nonlinear Dynamics mini-symposium during conferences: and has a position of a member of the scientific committees. d* The prominent researchers were members of scientific committees of international scientific meetings, such as DSTA Lodz 2011, 2013, 2015 and 2017, CASTR Sedlice 2011, 2013, 2015 and 2017, Poland, within which the project leader had a plenary lecture, as well as organized the series of four Minisymposium Classical and Celestial Mechanics, as well as in Nonlinear Dynamics Kharkov 2012, 2014, 2016. Two researchers participated in the work of EURO DYN ROME 2017, and one in the work of ACTA Belgrade 2017, then in the Math. Analysis, Math. Physics and Analytical Mechanics Rostov on Don 2016, Tensor Society Conference Differ. Geom. and Appl. Tokyo 2013, Tsukuba 2015, Matsumoto 2017 and others. One researcher held a series of invited lectures on the NTUA Athens for students in area of non-linear dynamics of gears. 7* The project successfully organized in 2012 common with the Scientific Society of Serbia and supported by the project in the field of physical chemistry, an international symposium of Nonlinear Dynamics. A special issue of the journal Scientific Review of the Scientific Society of Serbia was published with the papers of the participants. A large number of participants were from abroad (Japan, America, Russia, Israel, etc.) 8* 10 one-day mini-symposiums on topics of the project in MI SASA are organized, but also in cooperation with other projects, as well as two with bilateral projects China-Serbia. 9* Two special issues of TAM of the Serbian Soc. of Mechanics were edited, one dedicated to Anton Bilimovic, and the other Address to mechanics.

Equipment

Date: 18.01.2018.

ID of equipment (JUP): 1904
Approved equipment: 8-channel universal amplifier MX840A-QANTUM
Delivered: No
Year of delivery of equipment: 2010
Comment:

ID of equipment (JUP): 1911
Approved equipment: Force transducer in stainless steel U9B-5kN
Delivered: No
Year of delivery of equipment: 2010
Comment:

ID of equipment (JUP): 1912
Approved equipment: Torque transducer T20WN/5Nm
Delivered: No
Year of delivery of equipment: 2010
Comment:

ID of equipment (JUP): 5665
Approved equipment: Universal digital measuring amplifier
Delivered: No
Year of delivery of equipment: 2010
Comment:

ID of equipment (JUP): 5666
Approved equipment: additional module channel for Spider 8
Delivered: No
Year of delivery of equipment: 2010
Comment:

Comment:

ID of equipment (JUP): 5680

Approved equipment: Torque sensor

Delivered: No

Year of delivery of equipment: 2010

Comment:

ID of equipment (JUP): 36211

Approved equipment: desktop.3:PROCESOR: Core i5-2320, 3.00 GHz, 6 MB ke \square , 4 jezgra, 64 bita, 32 nm tehnologija izradeOPERATVNA MEMORIJA:8GB DDR3-1333 (pro \square irivo do 8 GB)TVRDI DISK: HDD SATA III 1000GB 7.2kGRAFI?KI ADAPTER: NVIDIA GeForce GT420 DisplayPort 1GB FH, podr \square ana rezolucija 1920x1200@60HzOPTI?KI DISK: BD Triple Writer SATA slim, Blu Ray RW i DVD RW kombinovani ure?ajMRE \square A: Ethernet adapter 10/100/1000MBit/sPOVEZIVANJE: USB 2.0 8 porta (2 na prednjoj strani) SLOTOVI ZA PRO \square IRENJA: 1 x PCI-Express 2.0 x16, 2 x PCI-Express x1PROSTOR ZA DISKOVE:2 x 3.5 \square interni, 1x3.5 \square eksterni i 2 x 5.25 \square eksterniNAPAJANJE: 330W, adapter za elektri?nu mre \square u 220V/50HzPERIFERIJE: Srpska latini?na tastatura, opti?ki mi \square Operativni Sistem: Windows 7 Professional 64bita

Delivered: Yes

Year of delivery of equipment: 2013

Comment: no. 6

ID of equipment (JUP): 41627

Approved equipment: notebook.3:PROCESOR: Intel Core i7-3612QM 2.1GHz 6MB, 22nm tehnologija izrade, 6 MB ke \square memorije , 4 jezgra, 64bitaOPERATVNA MEMORIJA:6 GB DDR3 1600 MHz PC3-12800TVRDI DISK: HDD SATA 500 GB 7.2kEKRAN:39.6 cm (15.6inca) HD magnesium LEDGRAFI?KI ADAPTER: podr \square ana rezolucija 1366x768@60 Hz, podr \square ana rezolucija na eksternom monitoru 1920x1200@60HzOPTI?KI DISK:Blu-ray Triple Writer incl. Playback SW, Blu Ray RW i DVD RW kombinovani ure?ajMRE \square A: Ethernet adapter 10/100/1000MBit/s, WLAN b/g/n, BluetoothPOVEZIVANJE:4xUSB 2.0, 1xdocking connector.DODATNO:Integrisan mikrofona, integrisana web kamera, Display Port, VGA izlaz, ?ita? kartica, srpska latini?na tastatura sa odvojenim numeri?kim tasterimaBATERIJA: 1st Battery 6cell 63Wh (5,800mAh)OPREMA:Opti?ki mi \square , Torba za ra?unar 15.6 \square , adapter za napajanje sa elektri?ne mre \square e 220V/50HzOperativni sistem:Windows 7 Professional 64bita

Delivered: Yes

Year of delivery of equipment: 2015

Comment: No 4

ID of equipment (JUP): 57579

Approved equipment: monitor.2:Tip panela: TFT LED backlit panelDijagonala: 50.8 cm (20-inch) widescreenRezolucija: 1600 x 900 HDodnos stranica: 16:9Odziv: 5 ms fast response timePriključci: VGA, DVIDodatne funkcije:Tilt angle : -5° / +15°, integrisani zvučnici

Delivered: Yes

Year of delivery of equipment: 2013

Comment: No 4

ID of equipment (JUP): 41606

Approved equipment: ton.16:HP 7406B (Q6471A) Model: HP 7406B (Q6471A) Kompatibilan sa: HP: Color Laserjet 3600, 3600DN, 3600N, 3800, 3800DN, 3800DTN, 3800N, CP 3505, 3505DN, 3505N, 3505X Kapacitet:4.000 str. Boja:Plava (cyan)

Delivered: Yes

Year of delivery of equipment: 2017

Comment: No 4

ID of equipment (JUP): 41607

Approved equipment: ton.18:HP 7406C (Q6472A) Model: HP 7406C (Q6472A) Kompatibilan sa: HP: Color Laserjet 3600, 3600DN, 3600N, 3800, 3800DN, 3800DTN, 3800N, CP 3505, 3505DN, 3505N, 3505X Canon: Lasershot LBP-1110, 1110SE, 1120, 22X, 250, 350, 5585L, 800, 810, LBP-P 420, P 420 Kapacitet:4.000 str. Boja:Žuta (yellow)

Delivered: Yes

Year of delivery of equipment: 2017

Comment: No 4

ID of equipment (JUP): 41608

Approved equipment: ton.19:HP 7406D (Q6473A) Model: HP 7406D (Q6473A) Kompatibilan sa: HP: Color Laserjet 3600, 3600DN, 3600N, 3800, 3800DN, 3800DTN, 3800N, CP 3505, 3505DN, 3505N, 3505X Kapacitet:4.000 str. Boja:Crvena (magenta)

Delivered: Yes

Year of delivery of equipment: 2017

Comment: No 4

ID of equipment (JUP): 41609

Approved equipment: ton.20:HP 7416 (Q5942A) Model: HP 7416 (Q5942A)
Kompatibilan sa: HP: Laserjet 4240, 4240N, 4250, 4250DTN, 4250DTNS1, 4250N, 4250TN, 4350, 4350DTN, 4350DTNS1, 4350N, 4350TN Kapacitet:10.000 str. Boja:Crna (black)

Delivered: Yes

Year of delivery of equipment: 2017

Comment: No 5

ID of equipment (JUP): 162899

Approved equipment: #desktop.3:PROIZVOĐAČ MODEL: HP Compaq Elite 8300
CMTFORMAT KUĆIŠTA: CMT Convertible
MinitowerPROCESOR: Intel® Core™ i5-3470 Processor 3.60 GHz (22nm, 6M Cache, 4 jezgra, 4 thread-a, 64bita)
OPERATIVNA MEMORIJA: 8GB DDR3, 1600 MHzTVRDI DISK: SATAIII, 1TB7.2KGRAFIČKI ADAPTER: AMD Radeon HD 7450 DP, 1GB RAM-a 11, Open GL 4.1, Podržana rezolucija 1920x1200@60HzOPTIČKI DISK: DVD
RWMREŽA: Ethernet adapter 10/100/1000MBit/
sPOVEZIVANJE: USB 2.0 - 6 portova; USB 3.0 - 4 porta,, 1xRS-232, DisplayPort, VGASLOTOVI ZA PROŠIRENJA: 2 x PCI-Express 3.0 x16, 1 x PCI-Express x1, 3 x PCIPROSTOR ZA DISKOVE: 3x3.5"" interni, 3x5.25"" eksterniNAPAJANJE: 320W, 220V/50HZPERIFERIJE: HP srpska latinična tastatura, HP optički mišOPERATIVNI SISTEM: Windows 7 Professional 64bita sa licencom za Windows 8.1 Pro; odgovarajući Recovery mediji

Delivered: Yes

Year of delivery of equipment: 2017

Comment: No 5

ID of equipment (JUP): 162901

Approved equipment: #monitor.4:Proizvođač - Model :: LG monitor 24MB65PY Panel Type :: IPS panel, LED backlit Diagonal Size :: 24" Resolution :: 1920x1200 Aspect ratio :: 16:10 Response Time :: 5ms
Conectivity :: DisplayPort, DVI, VGA, 3xUSB, 2x1W 2ch stereo speakers Additional Functions :: Podesivost po visini, podešavanje nagiba (Tilt), rotacija u portret, integrisani zvučnici

Delivered: Yes

Year of delivery of equipment: 2017

Comment: no 2

ID of equipment (JUP): 162900

Approved equipment: #notebook.3:PROIZVOĐAČ MODEL: Fujitsu Lifebook E754PROCESOR: Intel® Core™ i7-4702MQ Processor, 3.20

GHz, (22 nm, 6M Cache, 4 jezgra, 8 thread-a 64 bita)
 OPERATIVNA MEMORIJA: 6GB DDR3, 1600 MHzTVRDI
 DISK: SATA 500GB 5.4 rpmEKRAN: 15.6" dijagonala, LED,
 IPS, (Full HD), Anti-glare display, magnesium, 1,920 x 1,080
 GRAFIČKI ADAPTER: Intel® HD Graphics 4600, podržana
 rezolucija na eksternom monitoru 2560x1600OPTIČKI DISK:
 Blu Ray RW - DVD RW kombinovani uređjaj, mogućnost
 zamene dodatnom baterijom, dodatnim HDD-om ili plasticnom
 maskom ("weight saver") bez isključivanja uređjajaMREŽA:
 Ethernet adapter 10/100/1000MBit/s, WLAN b/g/n,
 BluetoothPOVEZIVANJE: USB 3.0 x 3 porta, USB 2.0 x 1
 port, 1 x docking connector, RJ-45, VGA izlaz, Display
 PortDODATNO: Integrisan mikrofoni, integrisana web kamera,
 srpska latinična tastatura sa odvojenim numeričkim
 tasterimaBATERIJA: 6 ćelija, 72WhrTEŽINA: 2.05
 kgOPREMA: Fujitsu optički mis, Fujitsu torba za 15.6"
 racunar, adapter za napajanje sa električne mreže
 220V/50HzOPERATIVNI SISTEM: Windows 7 Professional
 64bita sa licencom za Windows 8.1 Pro; odgovarajući Recovery
 mediji

Delivered: Yes
Year of delivery of equipment: 2017
Comment: no 6

ID of equipment (JUP): 245345

Approved equipment: Notebook.3:FUJITSU LIFEBOOK E554
Delivered: Yes
Year of delivery of equipment: 2015
Comment: No 6

ID of equipment (JUP): 245347

Approved equipment: Monitor.2:Fujitsu E22T-7 LED
Delivered: Yes
Year of delivery of equipment: 2015
Comment: No 4

ID of equipment (JUP): 245348

Approved equipment: Monitor.3:Fujitsu E24T-7 LED
Delivered: Yes
Year of delivery of equipment: 2015
Comment: No 1

ID of equipment (JUP): 245349

Approved equipment: Monitor.4:Fujitsu B23T-7 LED

Delivered: Yes

Year of delivery of equipment: 2015

Comment: No 5

ID of equipment (JUP): 245344

Approved equipment: Desktop.5:Fujitsu Celsius M740 32 GB sata

Delivered: Yes

Year of delivery of equipment: 2015

Comment: No 5

ID of equipment (JUP): 245346

Approved equipment: Notebook.5:HP zBook 17 sata III 256GB + 750

Delivered: Yes

Year of delivery of equipment: 2015

Comment: No 5

ID of equipment (JUP): 245350

Approved equipment: Printer.1:Lexmark MS415dn

Delivered: Yes

Year of delivery of equipment: 2015

Comment: No 13

ID of equipment (JUP): 245351

Approved equipment: Printer.8:Lexmark C925de

Delivered: Yes

Year of delivery of equipment: 2015

Comment: No 1

ID of equipment (JUP): 245352

Approved equipment: Printer.13:HP LaserJet P1102w CE658A
Delivered: Yes
Year of delivery of equipment: 2015
Comment: No 1

ID of equipment (JUP): 245353
Approved equipment: Skener.1:Epson Perfection V370
Delivered: Yes
Year of delivery of equipment: 2015
Comment: No 1

ID of equipment (JUP): 245354
Approved equipment: Eksterni hard d:APACER AC233 500GB 2.5" AP500GAC
Delivered: Yes
Year of delivery of equipment: 2015
Comment: no 4

ID of equipment (JUP): 245355
Approved equipment: Projekciono pla:VEGA Tripod S 180
Delivered: Yes
Year of delivery of equipment: 2015
Comment: no 1

ID of equipment (JUP): 245356
Approved equipment: projektor.2:Epson EB-X18
Delivered: Yes
Year of delivery of equipment: 2014
Comment: No 1

ID of equipment (JUP): 253459
Approved equipment: Eksterni hard disk.2:#Eksterni hard disk.2/APACER AC233 1TB 2.5" AP1TBAC233B-S USB 3.0

Delivered: Yes
Year of delivery of equipment: 2016
Comment: No 9

ID of equipment (JUP): 253460

Approved equipment: disk.6/Western Digital WDBWLG0030HBK-EESN 3TB, 3.5", USB 3.0

Delivered: Yes
Year of delivery of equipment: 2017
Comment: No 1

ID of equipment (JUP): 253461

Approved equipment: Tablet 5:#Tablet 5/Lenovo Tablet A7600 3G (A10-70)

Delivered: Yes
Year of delivery of equipment: 2016
Comment: No 6

ID of equipment (JUP): 253458

Approved equipment: Notebook.7:#Notebook.7/TMP236-M-39R9

Delivered: Yes
Year of delivery of equipment: 2017
Comment: No 20

ID of equipment (JUP): 162903

Approved equipment: ostalo.custom:Eksterni hard diskovi od 360 GB, bele boje(EUR)

Delivered: No
Year of delivery of equipment: 2010
Comment:

ID of equipment (JUP): 162905

Approved equipment: printer.custom:Printer u boji, laserski i toner odgovarajući za njega, 1 kom.(EUR)

Delivered: No

Year of delivery of equipment: 2010
Comment:

ID of equipment (JUP): 162906

Approved equipment: scanner.custom:Skener(EUR)

Delivered: No

Year of delivery of equipment: 2010
Comment:

ID of equipment (JUP): 162907

Approved equipment: ostalo.custom:Video bim i platno za projektovanje 2x2m(EUR)

Delivered: No

Year of delivery of equipment: 2010
Comment:

ID of equipment (JUP): 163133

Approved equipment: printer.custom:Laserski stampac obican, sa tonerom(EUR)

Delivered: No

Year of delivery of equipment: 2010
Comment:

ID of equipment (JUP): 226196

Approved equipment: ton.17:HP Toner for use 285A CE285A (HP Toner for use 285A CE285A) - novi

Delivered: No

Year of delivery of equipment: 2010
Comment:

ID of equipment (JUP): 226200

Approved equipment: ton.17:HP toner black high capacity (CE390X) (HP toner black high capacity (CE390X)) - novi

Delivered: No

Year of delivery of equipment: 2010
Comment:

Comment:

ID of equipment (JUP): 226210

Approved equipment: ton.17:HP Toner, black high capacity (CE410X) (HP Toner, black high capacity (CE410X)) - novi

Delivered: No

Year of delivery of equipment: 2010

Comment:

ID of equipment (JUP): 226219

Approved equipment: ton.17:HP Toner, cyan (CE411A) (HP Toner, cyan (CE411A)) - novi

Delivered: No

Year of delivery of equipment: 2010

Comment:

ID of equipment (JUP): 226221

Approved equipment: ton.17:HP Toner, magenta (CE413A) (HP Toner, magenta (CE413A)) - novi

Delivered: No

Year of delivery of equipment: 2010

Comment:

ID of equipment (JUP): 226223

Approved equipment: ton.17:HP Toner, yellow (CE412A) (HP Toner, yellow (CE412A)) - novi

Delivered: No

Year of delivery of equipment: 2010

Comment:

ID of equipment (JUP): 226275

Approved equipment: ton.17:HP 42A Black LaserJet Toner Cartridge Q5942A (HP 42A Black LaserJet Toner Cartridge Q5942A) - novi

Delivered: No

Year of delivery of equipment: 2010

Comment:

Comment:

ID of equipment (JUP): 226285

Approved equipment: ton.17:HP LaserJet Q2612A Black Print Cartridge(12A) (HP LaserJet Q2612A Black Print Cartridge(12A)) - novi

Delivered: No

Year of delivery of equipment: 2010

Comment:

ID of equipment (JUP): 226299

Approved equipment: ton.17:HP 35A Black LaserJet Toner Cartridge CB435A (HP 35A Black LaserJet Toner Cartridge CB435A) - novi

Delivered: No

Year of delivery of equipment: 2010

Comment:

ID of equipment (JUP): 226325

Approved equipment: ton.17:HP 12A Black LaserJet Toner Cartridge Q2612A (HP 12A Black LaserJet Toner Cartridge Q2612A) - novi

Delivered: No

Year of delivery of equipment: 2010

Comment:

ID of equipment (JUP): 226340

Approved equipment: ostalo.custom:Cisco Catalyst 2960-X 48 GigE, 4 x 1G SFP, LAN Base (uključujući PRTNR SS 8X5XNBD Catalyst 2960-X 48 GigE, 4 x 1G SFP, LAN, AC Power Cord (Europe), C13, CEE 7, 1.5) ili ekvivalent sa sledecim karakteristikama
Neophodne karakteristike : L2 switch tipa Cisco Catalyst 2960X sa 48 GE portovima (RJ45) i 4 komada SFP 1GbE Uplink portova (WS-C2960X-48TS-L) ili ekvivalent sa proizvođačkim servisima za zamenu neispravnog uređaja po principu slanja istog dana (Same Day Shipment) za vreme trajanja garantnog perioda od 12 meseci Tehničke karakteristike: -Layer 2 Ethernet switch fiksne konfiguracije. -Mogućnost montaže u rek orman 19'' rackmountable, 1 RU. -48 10/100/1000 BaseT porta (RJ-45). -4 SFP bazirana gigabit Ethernet uplink porta (za 1000BASE-SX Ethernet module bez

Delivered: No

Year of delivery of equipment: 2010

Comment:

ID of equipment (JUP): 226350

Approved equipment: desktop.5: PROCESOR: 32nm tehnologija izrade, 10 MB keš memorije, 4 jezgra, 8 thread-ova, 64bita OPERATIVNA MEMORIJA: 32 GB DDR3, 1600 MHz TVRDI DISK: SSD 256GB + SATAIII 2 x 1TB GRAFIČKI ADAPTER: Diskretna, GPU jezgro sa 2GB RAM-a, podržana rezolucija 1920x1200@60Hz OPTIČKI DISK: Blu Ray RW i DVD RW kombinovani uređaj MREŽA: Ethernet adapter 10/100/1000MBit/s POVEZIVANJE: USB 2.0 - 8 portova; USB 3.0 - 2 porta PROSTOR ZA DISKOVE: 6x2.5(EUR)

Delivered: No

Year of 2010

delivery of equipment:

Comment:

ID of 226351

equipment (JUP):

Approved equipment: notebook.5: PROCESOR: 22nm tehnologija izrade, 6 MB keš memorije, 4 jezgra, 8 thread-ova, 64bita OPERATIVNA MEMORIJA: 16 GB DDR3 TVRDI DISK: SSD 256GB + 1TB SATA, 5400rpm EKTRAN: Dijagonala 17.3(EUR)

Delivered: No

Year of 2010

delivery of equipment:

Comment:

ID of 226352

equipment (JUP):

Approved equipment: monitor.4: Tip panela: IPS matrica, LED backlit Dijagonala: 24(EUR)

Delivered: No

Year of 2010

delivery of equipment:

Comment:

ID of 226403

equipment (JUP):

Approved equipment: printer.custom:HP LaserJet P2035 Printer(EUR)

Delivered: No

Year of 2010

delivery of equipment:

Comment:

ID of 226481

equipment (JUP):

Approved equipment: ton.17:CANON INK TANK PGI-550 PGBK (CANON INK TANK PGI-550 PGBK) - novi

Delivered: No

**Year of
delivery of
equipment:** 2010
Comment:

**ID of
equipment
(JUP):** 226485

**Approved
equipment:** ton.17:CANON INK TANK CLI 551C (CANON INK TANK
CLI 551C) - novi

Delivered: No

**Year of
delivery of
equipment:** 2010

Comment:

**ID of
equipment
(JUP):** 226489

**Approved
equipment:** ton.17:CANON INK TANK CLI 551M (CANON INK TANK
CLI 551M) - novi

Delivered: No

**Year of
delivery of
equipment:** 2010

Comment:

**ID of
equipment
(JUP):** 226491

**Approved
equipment:** ton.17:CANON INK TANK CLI 551Y (CANON INK TANK
CLI 551Y) - novi

Delivered: No

**Year of
delivery of
equipment:** 2010

Comment:

**ID of
equipment
(JUP):** 226493

**Approved
equipment:** ton.17:CANON INK TANK CLI 551BK (CANON INK TANK
CLI 551BK) - novi

Delivered: No

**Year of
delivery of
equipment:** 2010

Comment:

**ID of
equipment
(JUP):** 231808

**Approved
equipment:** monitor.3: Tip panela: TFT, LED backlit Dijagonala: 24(EUR)

Delivered: No

**Year of
delivery of
equipment:** 2010

Comment:

Comment:

ID of equipment (JUP): 41611

Approved equipment: printer.custom:Stampac Color LaserJet Enterprise CP5525dn (CE708A)(EUR)

Delivered: No

Year of delivery of equipment: 2010

Comment:

ID of equipment (JUP): 41612

Approved equipment: ostalo.custom:Toner za stampac 5525dn - crni -HP CE270A black(EUR)

Delivered: No

Year of delivery of equipment: 2010

Comment:

ID of equipment (JUP): 41614

Approved equipment: ostalo.custom:Toner za stampac 5525dn - zuta - HP CE272A yellow(EUR)

Delivered: No

Year of delivery of equipment: 2010

Comment:

ID of equipment (JUP): 41616

Approved equipment: ostalo.custom:Toner za stampac 5525dn - plava -HP CE271A Cyan(EUR)

Delivered: No

Year of delivery of equipment: 2010

Comment:

ID of equipment (JUP): 41618

Approved equipment: ostalo.custom:Toner za stampac 5525dn - crvena -HP CE273A Magenta(EUR)

Delivered: No

Year of delivery of equipment: 2010

Comment:

Comment:

Date: 18.01.2018.

Signature

Stamp