



Technical Committee for Computational Kinematics

REPORT OF ANNUAL ACTIVITY from 2012 to 2013

Technical Committee for Computational Kinematics

ITRI, Taiwan, 31.10.2013

Chair: Prof. Dr.-Ing. Doina PISLA

Technical University of Cluj-Napoca
Memorandumului 28 Cluj-Napoca, Romania
Email: doina.pisla@mep.utcluj.ro

MEMBER ISSUES

TC-CK meeting at Computational Kinematics Workshop, 13.05.2013, Barcelona, Spain

Nomination for the new TC CK chair for the term 2014-2018

Prof. Dr. Ing. Doina Pisla - Chair 2014-2018

(doina.pisla@mep.utcluj.ro), Technical University of Cluj-Napoca, Research Center for Industrial Robots Simulation and Testing, Memorandumului 28, 400114 Cluj-Napoca, Romania, Tel: +40-264-401684, Fax: +40-264-401765

All the TC members have unanimously voted Doina Pisla for being Chair of the TC CK for the 2nd term (2014-2018).

Prof. Pislă has proposed the new deputy chair and the secretary.

Dr. Philippe Wenger - Deputy Chair (2014-2018)

(Philippe.Wenger@irccyn.ec-nantes.fr), IRCCyN - UMR CNRS 6597, Institut de Recherche en Communications et Cybernétique de Nantes. 1, rue la Noë - BP 92101 44321 Nantes Cedex 3, France

Dr. Wenger was unanimously voted to be the new deputy chair.

Dr. Erika Ottaviano – Secretary (2014-2018)

(ottaviano@unicas.it), DiMSAT, University of Cassino, via Di Biasio 43 (FR), Cassino, 03043, Italy

Dr. Ottaviano was unanimously voted to be the new Secretary of the TC CK.

MEMBER ISSUES

New members have been nominated in this year by different national committees:

1. Dr. Gökhan KİPER

(gokhankiper@iyte.edu.tr) with Department of Mechanical Engineering, Izmir Institute of Technology, 35430 Urla, İzmir, Makina Mühendisliği Bölümü, nominated as member

2. Dr. Marco CARRICATO

(marco.carricato@unibo.it) with Department of Industrial Engineering, University of Bologna, 40136 Bologna (BO), Viale Risorgimento 2, ITALY nominated as observer

The TC members have approved these nominations by email ballot.

STATEMENT FOR THE ACTIVITY OF THE TC

The TC of Computational Kinematics seeks to foster research on Computational Kinematics, organize conferences and workshops in this field, establish national and international collaborations and especially train young scientists in methods relevant for the treatment of kinematic problems.

The basic statements are operationalized by the following activities:

- Organize conferences (two major conferences: CK every four year and ARK every even year; furthermore support conferences and workshops)
- To update and continuously maintain the web page of the TC
- Establish national and international collaborations by visits, applying to international collaboration programs
- Organize Summer Schools, lectures, seminars.

DISCUSSION OF RECENT ACTIVITIES

- New TC Chair has been nominated for approval at the EC meeting (31.10.2013).
- New deputy chair and new secretary have been nominated for approval at the EC meeting (31.10.2013).
- New members have been nominated for approval at the EC meeting (31.10.2013).
- The TC plans to go on with the effort to promote the field of Computational Kinematics and to attract conferences under IFTOMM patronage.

DISCUSSION OF RECENT ACTIVITIES

Organising a Special Issue

“New Trends in Advanced Robotics”

ROMANIAN JOURNAL OF TECHNICAL SCIENCES – APPLIED MECHANICS

Volume 58, 1-2, 2013

(http://www.imsar.ro/MEC-APPL_2013_58_1_a0_Contents.pdf)

Guest editors: Doina Pisla, Manfred Husty

- It was put together as an initiative of the Technical Committee “Computational Kinematics”
- This special issue features the whole spectrum of Advanced Robotics from deep theoretical discussions of kinematic fundamentals to the application of robotics in different fields such as surgery and advanced manufacturing. It ranges from the introduction of new representations of Euclidean displacements, the discussion of theoretical aspects of parallel robots, questions of human gait analysis to control issues of telemanipulators and compliant mechanisms.
- Grateful thanks to the authors who have contributed excellent papers
- Grateful to the reviewers for the time and effort they spent evaluating the papers.
- This issue represents a valuable contribution to the field of Advanced Robotics and a source for further development and scientific discussion within this still growing branch of mechanical engineering.

ROMANIAN JOURNAL OF TECHNICAL SCIENCES APPLIED MECHANICS

formerly REVUE ROUMAINE DES SCIENCES TECHNIQUES
SÉRIE DE MÉCANIQUE APPLIQUÉE

Volume 58, N° 1-2

January – August 2013

SPECIAL ISSUE "NEW TRENDS IN ADVANCED ROBOTICS"

Guest Editors: Doina PISLA (Cluj-Napoca, Romania) and
Manfred HUSTY (Innsbruck, Austria)

CONTENTS

Special Issue on "NEW TRENDS IN ADVANCED ROBOTICS"	P.	3
JON M. SELIG, On the Geometry of the Homogeneous Representation for the Group of Proper Rigid-Body Displacements.	24	5
AHMED HACHEM CHERBI, VINCENZO PARENTI-CASTELLI, The potential of the 3-UPU topology for translational parallel manipulators and a procedure to select the best architecture for a given task.	26	29
VAHID NAZARI, LEILA NOTASH, Motion Recovery of Parallel Manipulators using Generalized Inverse and Partitioned Jacobian Matrix.	16	55
YUKIO TAKEDA, SATOSHI INADA, SHOHEI KAWASUMI, DAISUKE MATSUURA, KAZUYA HIROSE, KEN ICHIRYU, Kinematic design of 3-RPSR parallel mechanism for movable-die drive mechanism of pipe bender.	26	71
HANNES BLEULER, MOHAMED BOURI, LAURA SANTOS-CARRERAS, SIMON GALLO, ALI SENGÜL, GIULIO ROGININI, REYMOND CLAVEL, Trends in Surgical Robotics.	9	97
STELIAN BRAD, MIRCEA MURAR, Novel architecture of intelligent axes for fast integration into reconfigurable robot manipulators: a step towards sustainable manufacturing.	22	107
DAISUKE MATSUURA, NOBUYUKI IWATSUKI, MASAFUMI OKADA, Simultaneous Position and Stiffness Distribution Control of Elastic Redundant Closed-Loop Mechanism.	20	129
ALEŠ HACE, MARKO FRANC, Robust Control for Haptic-Based Robotic Teleoperation.	24	149
DANIELA TARNITA, MARIUS CATANA, DAN TARNITA, Nonlinear Analysis of Normal Human Gait for Different Activities with Application to Bipedal Locomotion.	16	173

DISCUSSION OF RECENT ACTIVITIES

Publishing the Springer book: New Trends in Medical and Service Robots - Theory and Integrated Applications (Eds: Pisla, Doina et al)

Series: Mechanisms and Machine Science, Vol. 16, ISBN 978-3-319-01591-0, DOI 10.1007/978-3-319-01592-7, 2014
<http://www.springer.com/engineering/robotics/book/978-3-319-01591-0>



DISCUSSION OF RECENT ACTIVITIES

Doctor Honoris Causa of the Technical University of Cluj-Napoca, Romania

Professor Manfred Husty

Awarding Ceremony - 4.04.2013



MEETINGS AND VISITS

- The TC CK meeting took place on 13.05.2013 during CK 2013, Barcelona, Spain. The agenda was: Report of the previous meeting; Activities of TC CK in the last time; Report of the 6th Workshop on Computational Kinematics; Member issues; Future planned activities; Next meeting; Others.
- About the nomination for new TC CK Chair for the term 2014-2018, the TC members have unanimously voted Doina Pisla for being Chair of the TC CK for the 2nd term (2014-2018). Philippe Wenger was unanimously voted to be Deputy Chair and Erika Ottaviano was unanimously voted to be Secretary of the TC CK.
- Doina Pisla visited University of Innsbruck between 7-14.01.2013 within the joint research project Austria-Romania (2012-2013).
- Manfred Husty visited Technical University of Cluj-Napoca between 3-6 April 2013 within the joint research project Austria-Romania (2012-2013) and hold three days lectures and seminars for the students at the Technical University of Cluj-Napoca, Romania.
- A Ph.D student of Philippe Wenger visited the University of Innsbruck from 1 to 30 June 2013 in the frame a bilateral research project Austria-France (2013-2014). Manfred Husty visited IRCCyN-Ecole Centrale de Nantes from 7 to 25 October 2013 in the frame of the above mentioned bilateral program. As a result, new interesting results on lower-mobility parallel manipulators were obtained and part of them were presented in a joint paper during the IAK'2013 conference in Lima, Peru in 9-11 september 2013.
- Erika Ottaviano visited Technical University of Cluj-Napoca and many research laboratories in the field of mechanical engineering between 12-15 June 2013.
- Doina Pisla visited Nanyang Technological University of Singapore during ISRM 2013 (<http://2013.iftomm-isrm.org/>) and participated also at TC meeting for Robotics and Mechatronics (Chair: I-Ming Chen).

RESEARCH JOINT COLABORATIONS AND EXCHANGES

Among the members of the TC CK are a lot of collaborations on an institutional or private basis. There should be some effort to channel these activities in joint project applications e.g. within European research frameworks. An important issue is to improve the connections between the universities and the companies through direct projects regarding implementing of the research results in the industry.

- Bilateral research project between Austria-France in the field of Parallel Robots - Project aproved 2013-2014.
- Bilateral research project between Austria-Romania in the field of Parallel Robots for Medical Applications - Project aproved 2012-2013
- Bilateral Erasmus Academic Agreement Bilbao, Spain-Cluj,Romania in the field of Robots with Professors and Students Mobility (2010-2014).
- Bilateral Erasmus Academic Agreement Innsbruck, Austria-Cluj, Romania in the field of Robots with Professors and Students Mobility (2013-2014).
- Bilateral Erasmus Academic Agreement Duisburg, Germany-Cluj, Romania in the field of Robots with Professors and Students Mobility (2013-2014).
- Joint project between Universite Laval (C. Gosselin) and University Innsbruck approved.
- Collaboration between University Innsbruck and National Cheng Kung University (Ch. Huang) established.

CONFERENCE EVENTS

Organising the 6th International Workshop on Computational Kinematics 2013, Barcelona, Spain, May, 12-15, 2013

Conference Chair: Federico Thomas
Conference Co-chair: Alba Pérez Gracia

Many members of TC have been involved and have been active in the review process of the papers in the topics of the conference.

- Submissions: 75
- Accepted papers: 44
- Registered participants: 60

6th International Workshop on Computational Kinematics 2013



CONFERENCE EVENTS



Second Conference on

Interdisciplinary
Applications of
Kinematics

September 9-11, 2013

Lima, Peru



CONFERENCE EVENTS

Objectives

Kinematics is an exciting area of computational mechanics and plays today a central role in a great variety of fields and industrial applications. Apart from research in pure kinematics, the field is offering challenging problems of practical relevance that need to be solved in order for new technologies to develop.

To share inspiration and non-standard solutions among the different applications, the conference shall bring together scientists from several research fields related to kinematics, such as for example:

- Computational Kinematics
- Multibody Systems
- Industrial Machines
- Robotics
- Biomechanics
- Mechatronics
- Chemistry and Biology

Conference Topics and Call for Papers

The conference focuses on all aspects of kinematics and papers are especially solicited on the following topics:

- Modelling
- Optimization
- Experimental Validation
- Industrial Applications
- Theoretical Kinematics Methods
- Design

Organizers

Chairman: Andr s Kecskem thy (Germany)
Co-Chairman: Francisco Geu Flores (Germany)

International Scientific Committee:

J. Ambrosio (Portugal)
 J. Angeles (Canada)
 M. Ceccarelli (Italy)
 B. Corves (Germany)
 J. Cuadrado (Spain)
 S. Dubowsky (USA)
 M. Dutra (Brasil)
 B. Heimann (Germany)

J. Herder (The Netherlands)
 M. Hiller (Germany)
 T. Huang (China-Beijing)
 M. Husty (Austria)
 K. Kazerooni (USA)
 J. Lenarcic (Slovenia)
 C. Lopez-Cajun (Mexico)
 J.-P. Merlet (France)
 M. Morlock (Germany)
 A. M ller (Germany)
 V. Parenti-Castelli (Italy)
 A. Pott (Germany)
 D. Pisl (Romania)
 B. Roth (USA)
 B. Siciliano (Italy)
 P. Wenger (France)

Local Organizing Committee:

R. Callupe
 E. Carrera
 D. Elias
 R. Hern niz
 IFTOMM Per 

In order to enable all participants to achieve a maximal input, the conference is planned without parallel sessions.



Conference Secretariat

www.uni-due.de/imr/IAK2013

Conference Location

The conference will be held in Lima, Peru. The city is located in the west of Peru, directly at the Pacific Ocean.

Important dates

Paper submission:31.05.2013
 Notification of acceptance:05.07.2013
 Final paper submission:09.08.2013
 Latest registration:09.08.2013

Registration fees

The registration fees are as follows:

Delegates  450.00
 Late registration (after 09.08.2013).....  550.00
 Accompanying persons & students.....  300.00

The registration fees include conference proceedings, coffee breaks, lunches, the conference banquet and the reception. There will be a printed proceedings book by Springer after the conference.

Social Program

The social program will include several excursions in and around Lima. Details shall be posted at a later date. Persons wishing assistance on travels before and after conference are kindly requested to contact the conference secretariat in due time.

Patronage

The conference is under the patronage of IFTOMM, the International Federation for the Promotion of Mechanism and Machine Science, as well as the University of Duisburg-Essen, the Pontificia Universidad Cat lica del Per  and the Universidad de Piura.

Accommodation

Accommodation shall be in the conference hotel in Lima, not far from the ocean.

TEACHING ACTIVITIES

Prof. Doina Pislă has organised a series of lectures and seminars between 3-6.04.2013 at the Technical University of Cluj-Napoca, Romania where prof. Manfred Husty was invited as speaker with the topics:

Algebraic Geometry in Robot Kinematics

47 students (Bachelor, Master and PhD) have participated at this event.

FUTURE PLANNED ACTIVITIES

- ARK 2014-Advances in Robot Kinematics, 14th International Symposium, Ljubljana, June 29- July 3, 2014: <http://www.ijs.si/ijsw/V000/IJS/ARK2014> .
- "Second International Conference on Cable-Driven Parallel Robots" (CableCon 2014) , Duisburg (Germany) 24-27 August, 2014.
- Third International Workshop on Medical and Service Robots-MESROB 2014, 9-11 July 2014, Lausanne, Switzerland.

Thank you for your attention!