

11<sup>th</sup> International Symposium  
ADVANCES IN ROBOT KINEMATICS

FINAL PROGRAMME



June 22-26, 2008  
Batz-sur-Mer, France



**Organized by**  
IRCCyN, Nantes, France

**In collaboration with**  
The "Jožef Stefan" Institute, Ljubljana, Slovenia

**Under the patronage of**  
IFTToMM International Federation for the Promotion of Mechanism and Machine Science

**Conference Chairmen**  
J. Lenarčič, The "Jožef Stefan" Institute, Ljubljana, Slovenia  
P. Wenger, IRCCyN, France

### **International Scientific Committee**

Chairman:

B. Roth, Stanford University, USA

J. Angeles	McGill University, Montréal, Canada
C. Galletti	University of Genoa, Italy
M. Hiller	University of Duisburg, Germany
M. Husty	University of Innsbruck, Austria
O. Khatib	Stanford University, USA
J.M. McCarthy	University of California, Irvine, USA
V. Parenti-Castelli	University of Bologna, Italy
F. Park	Seoul University, Korea
B. Siciliano	Università di Napoli Federico II, Italy
M.M. Stanisic	University of Notre Dame, USA
F. Thomas	University of Barcelona, Spain
K.J. Waldron	Stanford University, USA

### **Organizing Committee**

M.A. Audrain, S. Caro, D. Chablat, S. Julienne, G. Le Vey, P. Wenger

**Sponsored by**  
Ecole Centrale de Nantes  
Centre National de la Recherche Scientifique  
Région Pays de la Loire  
Ministère de l'Enseignement Supérieur et de la Recherche



# Programme Summary

## *Scientific Programme*

### Sunday, June 22

17.00-20.00: Registration and Welcome address (*Chair: P. Wenger*)

### Monday, June 23

- 9.00-10.45: Singularity Analysis of Parallel Manipulators I (*Chair: F. Thomas*)  
11.15-12.30: Singularity Analysis of Parallel Manipulators II (*Chair: V. Parenti-Castelli*)  
14.30-16.15: Design of Robots and Mechanisms I (*Chair: J. Angeles*)  
16.45-18.00: Design of Robots and Mechanisms II (*Chair: B. Roth*)

### Tuesday, June 24

- 9.00-10.45: Methods in kinematics I (*Chair: M. Husty*)  
11.15-12.30: Methods in kinematics II (*Chair: J. Lenarčič*)  
14.30-16.15: Motion Planning and Mobility I (*Chair: O. Khatib*)  
16.45-18.00: Motion Planning and Mobility II (*Chair: L. Romdhane*)

### Wednesday, June 25

- 9.00-10.45: Performance and Properties of Mechanisms I (*Chair: J.M. McCarthy*)  
11.15-12.30: Performance and Properties of Mechanisms II (*Chair: J.P. Merlet*)

### Thursday, June 26

- 8.30-10.15: Measure and Calibration I (*Chair: S. Dubovsky*)  
10.45-12.00: Measure and Calibration II (*Chair: R. Di Gregorio*)  
13.30-14.45: Kinematic Analysis and Workspace I (*Chair: P. Laroche*)  
15.00-16.15: Kinematic Analysis and Workspace II (*Chair: J.M. Rico*)

## *Social Programme*

### Sunday, June 22

19:30-22.00: Welcome party

### Monday, June 23

18.00-19.30: Beach party

### Tuesday, June 24

19.30-22.15: Soirée crêpes and Musical Show

### Wednesday, June 25

14.00-19.30: Excursion to Guérande and Visit of Salt Marsh Museum  
20.00-23.00: Conference Dinner

### Thursday, June 26

17.00-19.30: Volley-ball Tournament

# SUNDAY, JUNE 22

**17.00-20.00: Registration and Welcome address**

*Chair: P. Wenger*

# MONDAY, JUNE 23 - MORNING

**9.00-10.45: Singularity Analysis of Parallel Manipulators I**

*Chair: F. Thomas*

*M. Conconi, M. Carricato*

A New Assessment of Singularities of Parallel Kinematic Chains

*J. Hubert, J.P. Merlet*

Singularity Analysis through Static Analysis

*G. Gogu*

Constraint Singularities and the Structural Parameters of Parallel Robots

*X. Kong*

Forward Displacement Analysis and Singularity Analysis of a 3-Rpr Planar Parallel Manipulator

**10.45-11.15: Coffee break**

**11.15-12.30: Singularity Analysis of Parallel Manipulators II**

*Chair: V. Parenti-Castelli*

*T. Tanev*

Geometric Algebra Approach to Singularity of Parallel Manipulators with Limited Mobility

*P. Ben-Horin, M. Shoham, S. Caro, D. Chablat, P. Wenger*

Singulab - A Graphical User Interface for the Singularity Analysis of Parallel Robots Based On Grassmann-Cayley Algebra

*D. Kanaan, P. Wenger, D. Chablat*

Singularity Analysis of Limited-Dof Parallel Manipulators Using Grassmann-Cayley Algebra

**12.30-14.30: Lunch**

MONDAY, JUNE 23 - AFTERNOON

**14.30-16.15: Design of Robots and Mechanisms I**

*Chair: J. Angeles*

*M. Gouttefarde, S. Krut, O. Company, F. Pierrot, N. Ramdani*  
On The Design of Fully Constrained Parallel Cable-Driven Robots

*P. Larochelle*  
Synthesis of Part Orienting Devices for Spatial Assembly Tasks

*A. Rojas Salgado, Y. Ledezma Rubio*  
Minimum Energy Manipulator Design

*G.S. Soh, J.M. McCarthy*  
Synthesis and Analysis of a Constrained Spherical Parallel Manipulator

**16.15-16.45: Coffee break**

**16.45-18.00: Design of Robots and Mechanisms II**

*Chair: B. Roth*

*P. Ben-Horin, F. Thomas*  
A 3-Motor 6-Dof Parallel Robot

*M. Khan, M. Zoppi, R. Molfino*  
4-Dof Parallel Architecture for Laparoscopic Surgery

*C. Grand, P. Martinelli, J.-B. Mouret and S. Doncieux*  
Flapping-Wing Mechanism for Abird-Sized UAVS: Design, Modeling and Control

**18:00-19.30: Beach party**

**19.30-21.30: DINNER**

# TUESDAY, JUNE 24 - MORNING

## 9.00-10.45: Methods in kinematics I

*Chair: M. Husty*

*M. Janiak, K. Tchon*

Extended Jacobian Inverse Kinematics and Approximation of Distributions

*J.M. Selig, P. Donelan*

A Screw Syzygy with Applications to Robot Singularity Computation

*K. Tchon, L. Malek*

Singularity Robust Jacobian Inverse Kinematics for Mobile Manipulators

*K. Wohlhart*

Robots Based on Assur Group A (3.5)

**10.45-11.15: Coffee break**

## 11.15-12.30: Methods in kinematics II

*Chair: J. Lenarčič*

*G. Le Vey*

Kinematics of Free-Floating Space Systems Through Optimal Control Theory

*P. Donelan*

Genericity Conditions for Serial Manipulators

*I. Parkin*

Alternative Forms for Displacement Screws and Their Pitches

**12.30-14.30: LUNCH**

# TUESDAY, JUNE 24 - AFTERNOON

## **14.30-16.15: Motion Planning and Mobility I**

*Chair: O. Khatib*

*S. Ambike, J. Schmiedeler*

Time-Invariant Strategies in Coordination of Human Reaching

*A. Muller, J. Rico*

Mobility and Higher Order Local Analysis of the Configuration Space of Spatial Mechanisms

*J.F. Gauthier, J. Angeles, S. S. Nokleby*

Optimization of a Test Trajectory For Scara Systems

*S. Lahouar, S. Zegloul, L. Romdhane*

Singularity Free Path Planning for Parallel Robots

## **16.15-16.45: Coffee break**

## **16.45-18.00: Motion Planning and Mobility II**

*Chair: L. Romdhane*

*J. Carretero, I. Ebrahimi, R. Boudreau*

A Comparison Between Two Motion Planning Strategies for Kinematically Redundant Parallel Manipulators

*O. Alba-Gomez, A. Pamanes, P. Wenger*

Trajectory Planning of Parallel Manipulators for Global Performance Optimization

*E. Demircan, L. Sentis, V. De Sapio, O. Khatib*

Human Motion Reconstruction by Direct Control of Marker Trajectories

**19.30-21.15: Outside Dinner "Soirée Crêpes"**

**21.15-22.15: Musical Show "Voyage en Celtie"**



# WEDNESDAY, JUNE 25 - MORNING

## 9.00-10.45: Performance and Properties of Mechanisms I

*Chair: J.M. McCarthy*

*A. Karger*

New Self-Motions of Parallel Manipulators

*M. Rabl, B. Jüttler, L. Gonzales-Vega*

Exact Envelope Computation for Moving Surfaces with Quadratic Support Functions

*G. Berselli, R. Vertechy, G. Vassura, V. Parenti-Castelli*

A Compound-Structure Frame for Improving the Performance of a Dielectric Elastomer Actuator

*E. Macho, O. Altuzarra, C. Pinto, A. Hernandez*

Transitions Between Multiple Solutions of the Direct Kinematic Problem

## 10.45-11.15: Coffee break

## 11.15-12.30: Performance and Properties of Mechanisms II

*Chair: J.P. Merlet*

*N. Rakotomanga, D. Chablat, S. Caro*

Kinetostatic Performance of a Planar Parallel Mechanism with Variable Actuation

*G. Nawratil*

Results on Planar Parallel Manipulators with Cylindrical Singularity Surface

*C. Quennouelle, C. Gosselin*

Stiffness Matrix of Compliant Parallel Robots

## 12.30-14.30: LUNCH

## WEDNESDAY, JUNE 25 - AFTERNOON

**14.00-17.00: Excursion to Guérande**

**17.00-19.00: Visit of Salt Marsh Museum "Aperçu Salé"**

**20.00-23.00: Conference Dinner "Menu Saveur"**

# THURSDAY, JUNE 26 - MORNING

## 8.30-10.15: Measure and Calibration I

*Chair: S. Dubovsky*

*S. Briot, I. Bonev*

A Meaningful Measure for Orientation Errors of Spatial Robots

*P. Cardou, J. Angeles*

Angular-Velocity Estimation from The Centripetal Component of the Rigid-Body Acceleration Field

*R. Di Gregorio*

A Different Point of View to Define the Distance Between Two Rigid-Body Poses

*P. Last, C. Budde, D. Schütz, J. Hesselbach, A. Raatz*

Parallel Robot Calibration by Working Mode Change

## 10.15-10.45: Coffee break

## 10.45-12.00: Measure and Calibration II

*Chair: R. Di Gregorio*

*S. O'Brien, J. Carretero*

Augmented Model of the 3-Prs Manipulator for Kinematic Calibration

*J.S. Plante, S. Dubovsky*

The Calibration of a Parallel Manipulator with Binary Actuation

*S. Barthélémy, P. Bidaud*

Stability Measure of Postural Dynamic Equilibrium

## 12.00-13.30: LUNCH

# THURSDAY, JUNE 26 - AFTERNOON

## **13.30-14.45: Kinematic Analysis and Workspace I**

*Chair: P. Larochele*

*M. Husty, E. Ottaviano, M. Ceccarelli*

A Geometrical Characterization of Workspace Singularities in 3R Manipulators

*C. D. Crane*

Kinematic Analysis of a Planar Tensegrity Mechanism with Pre-Stressed Springs

*A. De Santis, B. Siciliano*

Inverse Kinematics of Robot Manipulators with Multiple Moving Control Points

**14.45-15.00: Coffee break**

## **15.00-16.15: Kinematic Analysis and Workspace II**

*Chair: J.M. Rico*

*C.C Lee, J. Hervé*

On The Delassus Parallelogram

*A. Pott*

Forward Kinematics and Workspace Determination of a Wire Robot for Industrial Applications

*D. Pisla, N. Plitea, C. Vaida*

Kinematic Modeling and Workspace Generation for a New Parallel Robot Used in Minimally Invasive Surgery

**17.00-19.30: Volley-Ball tournament**

**19.30-21.30: Dinner**

# Practical information

## Location of the symposium

Belambra Club "Les Salines" 37, rue du Croisic 44740 Batz-sur-Mer, France

All technical sessions will take place in the main seminar room (ground floor)

## Registration

Opened Sunday 17:00 - 19:30 (in front of main entrance), on Monday 9:00 - 18:00 (seminar room entrance)

## Information for speakers

25 min are allotted for each paper (20 min + 5 min for discussion and changeover to the next speaker)

## Accommodation

All attendees stay in Belambra Club "Les Salines" and are granted full-board accommodation service from Sunday evening to Thursday afternoon. A free dinner will be served on Thursday for those participants who leave on Friday. The additional night of Thursday should be paid to the hotel upon arrival.

## Clothing

Informal clothing is an ARK standard. Since the symposium site is located in a coastal resort and has a large swimming pool, a bathing suit might be useful.

## Taxes and service

In restaurants and bars, taxes and service are usually included. In shops, prices are most often displayed all taxes included.