

WORKSHOP ON FUNDAMENTAL ISSUES & FUTURE RESEARCH DIRECTIONS FOR PARALLEL MECHANISMS & MANIPULATORS

WORKSHOP FORMAT

IMPORTANT INFORMATION FOR ALL PARTICIPANTS PLEASE READ !!!

We want to make sure that this workshop **creates significant opportunity for dialog** between the participants. Therefore we have chosen a fairly unusual format for the presentations of regular papers: each presenter serves not only as a speaker, but also as a panelist.

A) SESSION FORMAT FOR REGULAR PAPERS

The presentations of the regular papers have been grouped by topic into sessions of 3-5 papers. The length of each session is 20 minutes per paper. However, that time is broken up in the following way:

- 1. Each paper session starts with 10-minute presentations by all speakers back-to-back, with only 1-2 minutes in between for immediate questions.**
- 2. The remaining time is used for a panel discussion in which all speakers of the session serve on the panel.**

For example, if there are 4 papers in one session, the first 48 minutes are allocated for presentations (and quick questions) and the remaining 32 minutes are allocated for the panel discussion. The panel consists of the four speakers of the session, and is moderated by the session chairs.

AUTHOR PREPARATION FOR REGULAR PAPERS:

- 1. Please make sure that your presentation is only 10 minutes long.**
- 2. It is important that you make yourself familiar with the other papers in your session, so that you can relate your work to those of others and we can have a lively + productive discussion. You will receive copies of all papers in your session before the conference.**

B) SESSION FORMAT FOR WHITE PAPERS

All white papers will be presented as posters. Authors are encouraged to set up their posters as early as possible, e.g. on Wednesday evening, so that they are available throughout the workshop. Participants can view the posters during coffee breaks, etc. In addition, there is an 80-minute timeslot reserved on Friday afternoon exclusively for the posters. All white papers are also included in the conference proceedings.

AUTHOR PREPARATION FOR WHITE PAPERS:

Authors should prepare a short explanation of the posters to give to individual participants visiting their poster during the poster session.

C) WORKSHOP REPORTING AND SUMMARY

Workshop secretaries will take notes throughout the workshop to keep track of the discussions. They will report at the workshop summary on Friday afternoon.

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ADVANCE PROGRAM

WEDNESDAY - OCTOBER 2

- 2:30PM – Bus leaves from Montreal (DETC Hotel)
- 5:15PM – Bus arrives at Hotel Classique (Quebec City)
- 6:15PM – Bus leaves hotel for reception at Université Laval
- 6:30PM – Registration and reception at Université Laval,
including a visit of the robotics lab and demos
- 9:30PM – Bus returns to Hotel Classique

THURSDAY – OCTOBER 3

- 8:00AM – Bus leaves from Hotel to Université Laval
- 8:20AM – Welcoming address (C. Gosselin and I. Ebert-Uphoff)
- 8:30AM – Keynote Address I

J.-P. Merlet, “ [An Initiative for the Kinematic Study of Parallel Manipulators](#)”

9:30AM – Regular Papers: New Architectures 1

Session Chairs: S. Agrawal and F. Pierrot

1. I. Zabalza, J. Ros, J.J. Gil, J.M. Pintor, J.M. Jimenez
“[TRI-SCOTT. A MICABO like 6-DOF Quasi-Decoupled Parallel Manipulator](#)”.
2. P. Wenger, D. Chablat
“[Design of a Three-Axis Isotropic Parallel Manipulator for Machining Applications: The Orthoglide](#)”
3. X. Kong, C.M. Gosselin
“[A Class of 3-DOF Translational Parallel Manipulators with Linear I-O Equations](#)”

10:30AM – Coffee Break

10:45AM – Regular Papers: Kinetostatic Analysis

Session Chairs: J. Dai and T. Huang

1. U.A. Tol, J.-P. Clerc, G.J. Wiens, 3-08-02/13
["Micro/Macro Approach for Dexterity Enhancement of PKM's"](#)
2. J.L. Herder
["Some Considerations Regarding Statically Balanced Parallel Mechanisms \(SBPM's\)"](#)
3. S. Krut, O. Company, F. Pierrot
["Velocity Performance Indexes for Parallel Mechanisms with Actuation Redundancy"](#)
4. M.J.D. Hayes
["Architecture Independent Workspace Analysis of Planar Three-Legged Manipulators"](#)

12:00PM – Lunch with Keynote Address II

T. Brogårdh, ["PKM Research – Important Issues as seen from a Product Development Perspective at ABB Robotics"](#)

1:30PM – Industrial Panel

Panelists:

- Torgny Brogårdh, ABB Robotics, Sweden
- Ed Dougherty, August Design Inc., US
- Adam Jacoff, NIST, US
- Gerhard Serapins, CAE, Montreal, Canada

2:25PM – Regular Papers: Design and Optimization

Session Chairs: V. Krovi and P. Wenger

1. A.S. Sorensen, H.G. Petersen, O.G. Jakobsen, J. Steinicke
["Towards the Industrial Usage of Parallel Kinematic Chain Modules in a Fully Modular Robotic Manipulator"](#)
2. J. Yoon, J. Ryu
["Reconfigurability of a Parallel Manipulator: A Case Study"](#)
3. E. Ottaviano, M. Ceccarelli
["Optimum Design of Parallel Manipulators for Workspace and Singularity Performances"](#)
4. G.F. Liu, Z.X. Li
["Fast General Geometric Algorithms for Optimal Design of Parallel Manipulators"](#)
5. K. Kozak, P.A. Voglewede, I. Ebert-Uphoff, W. Singhose
["Concept Paper: On the Significance of the Lowest Linearized Natural Frequency of a Parallel Manipulator as a Performance Measure for Concurrent Design"](#)

4:00PM – Coffee Break

4:15PM – Regular Papers: Kinematics and Singularities

Session Chairs: M. Shoham and G. Wiens

1. A. Meschini, R. Sinatra, S. Pirrotta
["A Parallel Mechanism for a Satellite Antenna with Double Reflector"](#).
2. M.L. Husty, A. Karger
["Self Motions of Stewart-Gough-Platforms – An Overview"](#).
3. Y. Takeda, U. Spaelter, H. Funabashi
["Forward Displacement and Singularity Analysis of a Crank-Type 6-3 In-Parallel Actuated Mechanism"](#).
4. A. Perez, J.M. McCarthy
["Dual Quaternion Synthesis of a 2-TPR Constrained Parallel Robot"](#).

5:30PM – Bus leaves Univ. Laval for guided tour of City and Banquet downtown.

9:30PM – Bus returns to Hotel Classique

FRIDAY – October 4

8:00AM – Bus leaves from Hotel to Université Laval

8:30AM – Keynote Address III

J. Angeles, ["The Qualitative Synthesis of Parallel Manipulators"](#)

9:30AM – Regular Papers: New Architectures and Wire-Driven Manipulators

Session Chairs: V. Parenti-Castelli and Y. Takeda

1. X-J. Liu, J. Kim, J. Wang
["Two Novel Parallel Mechanisms with Less than Six DoFs and the Applications"](#).
2. J. Kim, J.C. Hwang, J.S. Kim, C.C. Iurascu, F.C. Park, Y.M. Cho
["Analysis and Design of a New 6 D.O.F. Full Tilting Parallel Mechanism"](#).
3. P. Lafourcade, M. Llibre, C. Reboulet
["Design of a Parallel Wire-Driven Manipulator for Wind Tunnels"](#).
4. A. Fattah, S.K. Agrawal
["Design of Cable-Suspended Planar Parallel Robots for an Optimal Workspace"](#).

10:45AM – Coffee Break

11:00AM – Regular Papers: Calibration and Applications

Session Chairs: J. Herder and J.-P. Merlet

1. I. Fassi, G. Legnani
[“Automatic Identification of a Minimum, Complete and Parametrically Continuous Model for the Geometrical Calibration of Parallel Robots”](#).
2. V. Parenti-Castelli, S. Venanzi
[“On the Joint Clearance Effects in Serial and Parallel Manipulators”](#)
3. M. Krefft, M. Frindt, J. Hesselbach, F.M. Wahl
[“Robotic Systems for Handling and Assembly -- High Dynamic Parallel Structures with Adaptronic Components --”](#).

12:00PM – Lunch with Panel on Education

Session Chairs: J.L. Herder, J.M. McCarthy

J.L. Herder, [“Proposal for a Self-Developing Practical Course in Parallel Mechanisms”](#).
(Additional details to be announced.)

1:30PM – White Papers – Poster Session

Session Chairs: C. Gosselin and I. Ebert-Uphoff

1. C. Lange, J-C Piedboeuf, E. Martin, J. Kövecses
[“Towards Docking Emulation using Hardware-in-the-Loop Simulation with Parallel Platforms”](#).
2. R.L. Williams, II
[“Parallel Robot Projects at Ohio University”](#).
3. B. Dasgupta
[“Redundancy Resolution Schemes for Parallel Manipulators with Force Redundancy”](#).
4. K. Mianowski
[“On Some Properties of POLMAN-3L Parallel Manipulator to the Use as a 3-D Measuring System for Industrial/Educational Applications”](#).
5. A.M. Hay, J.A. Snyman
[“Design of Parallel Manipulators for Optimal Conditioning Throughout a Prescribed Workspace”](#).
6. Z. Huang, Q.C. Li
[“On the Type Synthesis of Lower-Mobility Parallel Manipulators”](#).
7. J.M. Herve, M. Karouia
[“The Novel 3-RUU Wrist with No Idle Pair”](#).
8. Y-Q Zheng
[“Workspace Analysis of a Six DOF Wire-Driven Parallel Manipulator”](#).

9. Z. Xu, F. Xi, C.K. Mechefske
["Kinestatic Analysis and Optimization of a Tripod Attachment for Machine Tools"](#).
10. P. Zsombor-Murray
["Planar Point & Line Transformation with Blaschke-Grünwald Image Space Coordinates"](#).

2:50PM – Coffee Break

3.00PM – Regular Papers: Dynamics

Session Chairs: J. McPhee and J. Angeles

1. Y. Wu, C.M. Gosselin
["On the Synthesis of a Reactionless 6-DOF Parallel Mechanism Using Planar Four-Bar Linkages"](#).
2. W.A. Khan, V. Krovi
["Comparison of Two Alternate Methods for Distributed Forward Dynamic Simulation of a Four-Bar Linkage"](#).
3. I. Ebert-Uphoff, K. Kozak
["Review of the Role of Quasi-Coordinates for the Kinematic and Dynamic Modeling of Parallel Manipulators"](#).
4. J. Kövecses, J-C. Piedboeuf, C. Lange
["Methods for Dynamic Models of Parallel Robots and Mechanisms"](#).
5. T. Geike, J. McPhee
["On the Automatic Generation of Inverse Dynamic Solutions for Parallel Manipulators with Full and Reduced Mobility"](#).

4.40PM – Workshop Summary – Reports from Workshop Secretaries

Workshop secretaries summarize key issues and action items identified throughout the workshop.

5.30PM – Workshop Ends

6:00PM – Bus leaves for Montreal

6:30PM – Informal dinner for participants who are staying in Quebec City (not included in workshop registration fees)