

PRESS RELEASE – 18 September 2009
Microrobotics Mini symposium 2009 in Borovets
in the frame of 11th Congress of theoretical and applied mechanics
Hotel Samokov, 2 – 5 September 2009

The International FP6 Hydromel **Minisymposium “Microrobotics”** was held on 2nd September 2009 in the frame of 11th National congress on theoretical and applied mechanics 2-5.09.2009, mountain resort Borovets, Bulgaria. It is situated on the northern slope of the Rila Mountain, 70 km south of Sofia. Over 160 scientists from Bulgaria and European countries and USA take part in the congress hosted by Institute of Mechanics – Bulgarian Academy of Sciences .The papers were addressed through 4 main groups of specialist: researchers, designers, technologists and industry users.



Hotel Samokov - Borovets, hosted Hydromel symposium on Micro-robotics

In the **keynote lecture** “*Vision control of hybrid robot system for cells injection*” by **Assen Shoulev** an approach for two-dimensional vision control of cells injection is presented. Numerical algorithms for pipette point detection, auto focusing and tracking during the working process are developed. The sub-pixel accuracy of these algorithms and high precision linear measuring system integrated in the large range robot allow precise calibration of the image space.

The next talk “*Modeling of parallel structures with elastic joints for local micro and nano manipulators*”, presented by assoc. Prof. **Dimitar Chakarov** considered piezo actuated micromanipulators with serial-parallel structure including elastic joints. This structure allows a preliminary tension of the mechanical system in order to remove the backlashes and to improve the dynamic performance of the piezo-actuators. Considered approaches are experimented on the manipulator for cell injection of HTC.

In the paper “*Kinematic invariants with infinitesimally close positions of mechanism with two degrees of freedom*”, presented by Dr. **Vladimir Kotev**, some problems of synthesis of hybrid macro – micro robots with close kinematic chain by method of kinematic geometry are described. The structures of the manipulation mechanisms change according to the activation of macro motors or micro actuators. In both cases micro operations are performed by short-range movements. Next paper “*Computer modeling and simulation of controllable compliance joint*” was presented by Ph.D. Student **Michael Tsveov**. Here controllable compliance joint of robots is developed that creates a natural security in the

interaction with human. Controllable compliance joint is designed using two actuators - for position control and for compliance control.



Dr. Tiankov presented his paper on Micro-robotics Symposium

In the next talk presented by Dr. **Tihomir Tiankov**, some solutions of “*Modular robotic system for cell injection*” are suggested. It was introduced a modular strategy to robotize a cell-injection process. The aim of works was to evaluate the specific problems when combining two robotic systems with quite different working ranges, the centimeter and submicron range. A virtual model of the robotic system is built to find out the appropriate kinematic structure and to check its functionality of the mechanical construction. Control system integrating the whole modular robotic system is designed as open architecture system with possibility to include more peripheral devices as immobilization, sorting, quality control devices. An experimental setup is developed to validate the modular robot system approach for cell injection operation.

Aspects of reducing the hysteresis influence of piezo-electrical micromanipulator developed for Oocytes injection were presented by **Julien Latouche**, exchanged student from University of Besancon (France) for 3 Months period for practicum, in the report “*A survey on piezoelectric micromanipulators*”.

The final paper “*Modelling and design of robotic work stations for contact tasks*” was presented by Prof. D.Sc. **Krassimir Georgiev**. The design of robotic workstations requires modeling and use of modern software, modeling tools and interactive procedures.

The purpose of the Hydromel Mini Symposium on Microrobotics was to provide opportunities for scientists and engineers working in the field of Mechatronics, Robotics and Biomechanics in the framework of the FP6 Hydromel Project to present the results obtained and discuss current research, as well as to exchange new ideas, and establish a basis for future collaboration. Beautiful nature of the mountain resort Borovets contributed to the friendly and informal atmosphere of the event.

Contacts and information

More information about the 11th Congress on Theoretical and Applied Mechanics 2009 at

<http://www.imbm.bas.bg/>

More information about the Hydromel Minisymposium on Microrobotics:

- Dr. Vladimir Kotev – Organizer and member of the Hydromel team of the Institute of Mechanics –BAS.

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