

**A6 Control of Mechatronic Systems**  
Time: Tuesday, 14.09.2010, 3:50 p.m.  
Location: Humboldt-Building, Room 204 / Foyer

<b>Poster Session:</b>
<b>Chairman: S. Lambeck (DE-Ilmenau)</b>
A.D. Frolov, O. A. Vinogradova, A.D. Pavliy, D.N. Frolov (RU-St. Petersburg, BY-Minsk)
<b>Experience with digital microscopes</b> <b>Analytical Forming and Computer Simulator of Program Motions</b> We reviewed the theoretical and practical aspects of creating digital microscopes, in which the image of the object is projected onto the electronic.

Y. Litvinau, S. Karpovich, N. Kekish (BY-Minsk)
<b>Three degree-of-freedom movement simulator control system</b> The simulator for implementing video synchronized three degree-of-freedom movements is considered in the paper. The mechanic part of the simulator is based on the parallel manipulator that is capable of realizing two-coordinate rotations and vertical movements. Therefore the direct and inverse kinematic problem solution concepts for parallel manipulator of a specified structure are presented. The inverse kinematic problem solution resulted in the algorithm, a core part of the control system, that connects manipulator platform position and orientation with shafts angular coordinates of three actuators. The paper describes the control system that has been developed and implemented for the simulator considered. The control system includes a commands generation program, a commands reproduction program and a hardware controller. The commands generation program renders and splits input video data into scenes, enables to set platform position and orientation for every scene, generates appropriate control commands in XML format for every scene. The commands reproduction program reads the generated control commands and interacts with the hardware controller via RS-232C interface. The hardware controller, that is Mitsubishi FX3U-48 controller, controls three actuators that run the manipulator. The principles that lay down in the control system considered can be reused during similar simulators control systems prototyping.

I. Dainiak (RU-St. Petersburg, BY-Minsk)

**Analytical Forming and Computer Simulator of Program Motions**

Analytical method of the forming of program motion is based on supplementing of drive system dynamic model in accordance with analytical motion program, without solving of differential equation system. To realize this approach, model of coordinate system is needed in the form of differential equations which describe dynamic state of system in phase coordinates. For the aims of analytical forming of program motion, motion features of mechatronic system are defined in the form of integral multiformity, and the solving of the inverse problems of dynamics in the general mathematical statement is coming to the building of motion equations of mechatronic system using this integral multiformity of motion features. As result, we supplement of motion equations using the given integral multiformity and then find the control functions from supplemented equation system. The problem of dynamics as a rule doesn't have unique solution. This fact allows solving the inverse problems of dynamics in combination with the problem of stability and optimality of motion; generally, any additional conditions and limitations to dynamic characteristics of motion can be taken into account. Computer simulation of program motion was carried out by methods of holonomic automated systems in MATLAB.