



Technische Universität Berlin
Fakultät IV Elektrotechnik und Informatik
Fachgebiet Regelungssysteme
Leitung: Prof. Dr.-Ing. Jörg Raisch
Sekr. EN 11, Tel. 314-22999



Vortragsankündigung

Seminar Regelungssysteme LV 0430L654

Montag, 21. März 2016, 11:00 Uhr
Vortragsort: EN 223

Prof. Alexander Zuyev
MPI for Dynamics of Complex Technical Systems &
National Academy of Sciences of Ukraine

“Mathematical modeling and energy efficiency of the human gait”

This talk deals with a biomechanical multibody model of the human gait. Our study is based on the reconstruction of the spatial motion of reference points of the human body from a pair of planar projections. The time series, corresponding to these projections, are obtained in practice from two synchronized video cameras located at different places. Spatial trajectories of the reference points are used to define the kinematic characteristics (velocity of the center of mass and the angular velocity) for each rigid body in the biomechanical model considered. This kinematic description allows us to estimate the kinetic energy of the multibody system as a function of time. We follow the approach of V. Zatsiorsky et. al to define the mass and moments of inertia for different segments of the human body depending on the height, weight, and somatotype of a person. Based on these data, the potential energy of our multibody model in the gravity field is computed as well. The above energy functions allow evaluating the gait efficiency as the variation of the total energy over a double step. We also discuss other possible ways of defining the cost function in order to characterize the energy and comfort measure of the human gait.