The dynamic modelling of the unicycle with the drive system assistance

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Abstract: The problem of control of a unicycle and unicyclist vibrations in a plane is studied. The object of analysis consists of two basic parts: the wheel and the double pendulum. The equations of motion have been derived using the Lagrange equation of the second kind. The kinematic excitation has been applied to the unicyclist. The aim of control is to maintain the system unicycle-unicyclist in an unstable equilibrium around the given angular position. The control system has been applied to the wheel and the MATLAB/Simulink package has been used. At first, the standard ideal PID controller has been applied, and then another adjustment, based on the control system with positive feedback and the Kalman filter, has been finally used. In the future the proposed approach will be extended also to solve dynamical problem regarding transverse vibrations in order to design a prototype of the mentioned unicycle.

Słowa kluczowe: unicycle, dynamic modelling, control