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Experimental evaluation of PLC based fractional order PI^lambdaD^mu temperature control in pipeline

Jakub Petryszyn, Jakub Mozaryn, Stepan Ozana

Abstract: The following paper presents the experimental evaluation of the fractional order PI$^\lambda$D$^\mu$ temperature control in the pipeline, using standard PLC Siemens S7-1200 controller. Controller is based on the implementation of the Gr\"unwald-Letnikov differintegral Continuous Fraction Expansion approximation and tuned using Interior-Point optimization method with Integral Time Squared Error (ITSE) criterion. The PI$^\lambda$D$^\mu$ temperature control system was evaluated using simulations, and experiments on the laboratory stand. There is given the discussion of results obtained during the simulation, HIL and experimntal research, and further developements considering the accuracy and robustness of PLC based fractional order PI$^\lambda$D$^\mu$ control system.

[1)] Jakub Petryszyn, B.A. (M.Sc. student): Institute of Automatic Control and Robotics, Warsaw University of Technology, ul. Sw A. Boboli 8, 02-525, Warsaw, Poland (PL), jakub.petryszyn.stud@pw.edu.pl.

[2)] Jakub Mozaryn, Ph.D.: Institute of Automatic Control and Robotics, Warsaw University of Technology, ul. Sw A. Boboli 8, 02-525, Warsaw, Poland (PL), jakub.mozaryn@pw.edu.pl.

[3)] Stepan Ozana, Associate Professor: Faculty of Electrical Engineering and Computer Science, Department of Cybernetics and Biomedical Engineering, VSB-Technical University of Ostrava, 17. listopadu 2172/15, 708 00 Ostrava, Czech Republic (CZ), stepan.ozana@vsb.cz.