

DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

(State the objective of the project, describe the research to be carried out, and present reasons for choosing the research topic - max. 1 standard type-written page)

Variable-, fractional-order PID-like control

Conscious activity of achieving the intended objective (the position of the aircraft, production level of cars, motor angular velocity, called further objects with dynamically changing state) is currently realized in the so-called closed-loop system with a negative feedback. This means that, based on a current information about the state of the object and information about the demanded or planned level, the so-called error generates a decision concerning the most effective actions to achieve them. In practice, all dynamical plants are so called continuous-time ones, which means that their states are defined at any time instant. In practice, however, the information about the state of the circuit is taken at selected moments of time. Typically, these times equidistant in time. This period is called the period of the pulse and depends on the dynamics of the system. Such systems are called discrete-time systems. Today, almost all dynamical systems are discrete systems. The aim is therefore to minimize the deviation, ie the difference between what is and what should be. These decisions, changing in time are called control. The effectiveness of control is understood in the sense of a variety of criteria, which can be mentioned most often chosen: the speed of achieving the minimum energy expenditure, not to exceed current costs. Has developed a variety of decision-making principles in the center of decision-making or control unit. The oldest rule called PID control is based on the collective account of the error value, the difference between the present and the past value of the error and the sum of all deviations.

The aim of the project is to develop novelty more effective method of control by the use of the difference where from the present value the weighted sum of all previous error values a subtracted. The weighting factors decreases very quickly according to the distance of the error sample to the present sample. When calculating the sum one takes into account the current and all the weighted error values. And in this case, the weight is reduced due to the distance from the present time instant. This difference and the sum is called the difference and the sum of fractional orders. In the project there is proposed a further generalization consisting of a change of weights at any discrete time instant. This change of the weights determines the so-called order function. Appropriate change of the order function enables to increase or decrease of the impact of the difference or the sum in determining the control. This allows more efficient control of the plant, especially in a case of always existing external uncontrolled effects usually bulking to achieve the desired control results. These external influences are called external disturbances. Research carried out within the project will consist in finding suitable order function, optimizing the effects of control for the assumed optimality criteria.