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Comparison of the design process noninteger PID controller with a classical PID controller for DC Motor using simulated annealing

In this work, we will present a control method for DC motors based on noninteger and classic PID controller. In the first case, the derivative and integrator part of the controller have order between 0 and 1. The original element in this paper consists of a comparative analysis of various controllers stabilizing the position of the motor shaft. To design both types we using global optimization method simulated annealing. Electric drive plays crucial role in science and technology. Electric machine is an interesting object converting electricity to mechanical power or mechanical power to electricity. There is a vast literature on both modeling and control of various types of electric drives, e.g. [1; 2; 3; 7, 9]. In this work, we will consider a special problem in control of a DC motor. It will be analyzed how the noninteger and classical PID controller influence the efficiency of the system. Despite different concepts of "smart controllers" (e.g. neural controllers, fuzzy controllers, etc.), our research confirms that properly tuned PID controller is still useful in controlling the physical processes of various types, even control objects with distributed parameters. A formal control law for what we now call PID or three-term control was first developed using theoretical analysis, by Russian American engineer Nicolas Minorsky at 1922. Minorsky was researching and designing automatic ship steering for the US Navy and based his analysis on observations of a helmsman. The current capabilities of computer techniques allow the analysis of very complex dynamics of controlled systems using a classical and noninteger PID, that is, one that takes into account the actual mathematical models of amplifiers, integrating and differentiating elements. It is interesting how sensitive the obtained controller settings are compared to those of classic PID controller.

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