Control of periodically changing rotational velocity of a DC-motor modeled by a dynamical system with stick-slip friction

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Abstract: A problem of stick-slip oscillations may appear between contacting surfaces of various connections existing on the basis of friction phenomenon. It depends on viscous force, Coulomb force or a velocity-dependent force. These e ects appear in almost all mechanical systems, for instance, in positioning systems like servomechanisms, impulse encoders and stepper motors which operate at, or about zero velocity of relative motion between shafts and sliding bearings. This paper presents modelling of a DC-motor as a dynamical system with stick-slip e ect which appears while direction of rotation of its rotor crosses zero velocity speed. These investigations are made in accordance to some future applications of the control technique serving for explanation of bifurcation phenomena existing in such kind of discontinuous systems. To make the model of friction more exactly describing the occurred there friction phenomenon there will be applied some compensation technique allowing for reduction of velocity-dependent friction. Results are obtained with the use of numerical simulations.

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