

Maximal stick duration for an electromechanical system

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Abstract: Electromechanical systems are an interesting type of coupled systems. The mutual influence between electromagnetic and mechanical subsystems characterizes coupling. Each subsystem affects the behavior of the other. This work analyzes the dynamics of an electromechanical system considering the existence of Coulomb dry-friction in the mechanical subsystem. The friction induces two qualitatively different and alternate modes of motion of the mechanical subsystem, the stick- and slip-modes, with a non-smooth transition between them. Stick happens when the sum of all forces acting over the mechanical subsystem is zero during a non zero time interval. In the electromagnetic subsystem there is only slip. The objective of this paper is to characterize the dynamics of the coupled system considering the stick- and slip modes of the mechanical subsystem. The focus is to determine how the coupling between the two subsystems is affected by the stick- and slip oscillations of one subsystem. One of the variables of great interest in the analysis is the maximal stick duration, which depends on the electrical and mechanical parameters.

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