System Identification and Controller Design for a DC Electrical Motor

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Abstract : The aim of this paper is to determine in a concise way the transfer function that characterizes a DC electrical motor with a helix. In practice it can be obtained by applying a particular input to the system and then, based on the observation of its output, determine an approximation to the transfer function of the system. In our case, we use a step input and find the transfer function parameters that give the simulated first-order time response. The simulation of the system is done using MATLAB/Simulink. In order to determine the parameters, we assume a first order system and use the Broida approximation to determine the parameters and then its Mean Square Error (MSE). Furthermore, we design a PID controller for the control process first in the continuous time domain and tune it using the Ziegler-Nichols open loop process. We then digitize the controller to obtain a digital controller since most systems are implemented using computers, which are digital in nature.