Data-Driven Control for DC Motor

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***Abstract*—Data-Driven control techniques have become increasingly popular in recent years due to the wide availability of data and progress in data science. Data-Driven control design methods bypass the system identification step and directly exploit collected data to construct the controller. In this paper, we investigate the application of data-driven methods to the control of DC motor drives.**

***Index Terms*—data-driven control, DC motor**

I. Literature overview

The article [13] utilizes Data-Driven Control to train the control gains for better system controllability.

The article [10] presents Data-Driven Control used for system parameters estimation, an approach that we are planning to use.

[4] is an important article for our project, as it explores predictive current control for synchronous motor drives - a topic closely related to ours.

[7] introduces Permanent Magnet Synchronous Motor ripple avoidance using DDC.

[5] introduces novel data-enabled predictive control (DeePC) algorithm is presented that computes optimal and safe control policies using real-time feedback driving the unknown system along a desired trajectory while satisfying system constraints.

[8] is a canonical survey paper in the field. The authors explore the recent advances in DDC and discuss the perspectives of future related work.

Article [6] discusses the important attributes for systems with data-driven control: Stabilization, Optimality, and Robustness.

Article [12] explores the ability of the data-driven system to adapt and thus improve its performance in case of changes of parameters.

Article [2] analyzes the behavior of data-driven control in the extreme case of output saturation.

Article [11] is an official MATLAB tutorial to DDC, which we follow with our designed controller simulation in the beginning of our project.

A recent article [1] overviews a problem of state-feedback controllers for discrete-time linear time-invariant systems, based directly on measured data.

A PhD thesis [9] explores a Data-driven model reference control in the frequency-domain.

An article [3] deals with Data-Driven (DD) control design in a Model Reference (MR) framework.

Article [14] shows a discrete-time control-law from frequency-data of a continuous-time plant so that their hybrid interconnection matches a given continuous-time reference model up to the Nyquist frequency.

II. Introduction

III. Methods

IV. Results

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