Validation of data-driven dynamic measurement methods

Thesis outline - Gustavo Quintana Carapia

Summary

1. Introduction

Provides context, need, task conducted, and objective of the thesis. Introduces state of the art and locates the thesis with respect to the literature. Previews the published papers and presents fragments of their introductions. Also gives a preview of the methodology, results, and conclusions of the published papers. Gives an overview of the structure of the thesis.

2. Preliminaries

Presents the motivation for the input estimation methods. Introduces nomenclature, and formulates the input estimation problem. Gives a review of model based, and data-driven step input estimation methods. Discuss the need for uncertainty assessment in metrology applications.

3. Statistical analysis of the subspace step input estimation method.

Describes the theoretical background and the task conducted to reveal the mean and covariance values of the estimate. The estimate is a least squares solution of

3.1. unstructured and uncorrelated errors-in-variables problem

3.2. structured and correlated errors-in-variables problem

Describes the conditions required for the results to hold. Presents and discusses simulation results that validate the statistical analysis.

4. Experimental validation of the subspace step input estimation method.

Describes the experimental setup, the observations, and the results. Discusses the meaning of the real-life experiment results with respect to the theory and simulation.

5. Ramp input estimation methods

Formulates the research problem, describes the proposed solutions, and discusses the results of:

5.1. Adaptation of the subspace estimation method

5.2. Maximum likelihood estimation method

6. Conclusions

Presents a top level overview of the research work. Wraps up and provides closing to the introduction statements. Proposes future directions to continue.

7. Appendix

Derivation of the bias and covariance expressions considering unstructured and structured errors-in-variables estimation problems.

Proof of the lemma that is used to obtain the bias and covariance expressions.

8. List of publications

9. References