WEEK 7 MODELLING FREQUENCY RESPONSE

Objectives

To learn how to get frequency response from an approximate linear FOPDT model. To observe the frequency response of the approximate linear FOPDT model for a system. To observe the impact of parameter values on the frequency response.

Modelling Assignment

Disk File Suggestion: For all your data files that you save this week, start their names with "W7" (meaning week #7)

Week 8 Report

A draft of Week 8 Report is due the second school day before the next scheduled lab meeting.

WEEK 8 REPORT CONTENTS
FREQUENCY RESPONSE

Introduction

Theory & Background
Description & explanation of system components & connections
Schematic diagram
Input function(s) and output function
Theory & governing equations for components and system
Time domain and Laplace domain descriptions, OLTF
Approximate linear FOPDT model
Block diagram
Frequency response theory (like S&C, example 7-10)

Modelling
Equations & methods used in modelling

Procedure

Results
Experimental results. Estimates of errors in results.
Experimental and modelling results for sine input (typical curves, amplitude ratios, phase lags)
Experimental and modelling Bode plots (K_{cu}, ω_u, order of the system) (like S&C, example 7-11)

Discussion
Comparison among theory, experiment & modelling for sine input

Conclusions

Recommendation

Appendices
Physical properties
Modelling diagram, equations
Data curves & calculations

Attachments
Include a sheet for each team member that describes the contribution to the work in the laboratory since last reported.

Disk File Suggestion: Use file names beginning with "WR8"

WEEK 8 REPORTS & PLANT VISIT

Week 8 Report

Submission of final report and oral presentation (10 minute limit).

WEEK 8 ORAL PRESENTATION CONTENTS
Brief system description, including input & output functions
Review of performance curves (SSOC)
Description of frequency response experiments
Sample time response graph: Transients, steady oscillation, amplitude ratio (AR) & phase shift
Experimental Bode plots--order of the system
Modelling approach (approximate FOPDT)
Comparison of results of experiment & approximate model
Modelling results' Bode plot
Comparisons of experimental results and approximate modelling results
Conclusion(s) about system
Conclusion(s) about approximate model

Some suggested slides for Week 8 Report

Background
Theory
Modelling
Results
Conclusions

Theory
Transfer function
Parameters

Results
Time response
Experimental
Approximate model
Bode plots
K_{cu}, ω_u, order of the system

Background
System
Input
Output
SSOC
Operating Range

Modelling
Model equations
Parameters

Conclusions