Recommended Assessment

Stability Analysis

1. Based on the transfer functions of a Qube-Servo shown in a recommended assessment, determine the stability of the voltage to speed and the voltage to position equations from its poles.

2. From your results in the lab procedure from applying a step into your Qube-Servo 3, add the figures of the response you found.

<table>
<tr><td></td><td></td></tr>
<tr><td>(a) Voltage Input</td><td>(b) Position Response</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2">(c) Speed Response</td></tr>
<tr><td colspan="2">Qube-Servo Step Response</td></tr>
</table>

3. Based on the speed response and following the Bounded-Input Bounded-Output (BIBO) principle, what is the stability of the system? How does this compare with your results from the pole analysis?

4. Repeat the previous question but asses the stability of the position response and compare with your previous pole analysis.

5. As inquired in the lab procedure, is there an input where the open-loop servo position response is stable? If so, then modify your Simulink diagram to include your input, test it on the servo, and show the modified model as well as the position response. Based on this result, how could you define marginal stability in terms of bounded inputs?