EET 3732 – CONTROL SYSTEMS

MATLAB Project # 2

Objective:

Write a script to plot Root-Locus corresponding to the characteristic equation of a given transfer function.

Programming Steps:

1. Write down your name, date, course name, and project number at the beginning of your script as comments.
2. Explain the objective of your program as comments.
3. From the characteristic equation *q(s)* = 1 + *K*J(s)*, ask user to enter the coefficients of the numerator and denominator of *J(s)* as vectors.
4. In your script, change the value of the control gain *K* from zero to a large number.
5. Evaluate roots of the characteristic equation *q(s) = 0*

   $\Rightarrow 1 + K\dfrac{\prod_{i=1}^{m}(s+z_i)}{\prod_{j=1}^{n}(s+p_j)} = 0 \Rightarrow \prod_{j=1}^{n}(s+p_j) + K\prod_{i=1}^{m}(s+z_i) = 0$ each time you change the value of the control gain [you can use MATLAB *roots* function].
6. Plot the roots of each characteristic equation (with different value of *K)* on the same graph. Make sure to use some style instead of using simple line plot else your plot will be incorrect.

Note: Do not use any built-in root-locus function.

Sample Outputs

Characteristic Equation: `q(s)` $=1+K\dfrac{(s+1)}{s(s+2)(s+4)^2}$

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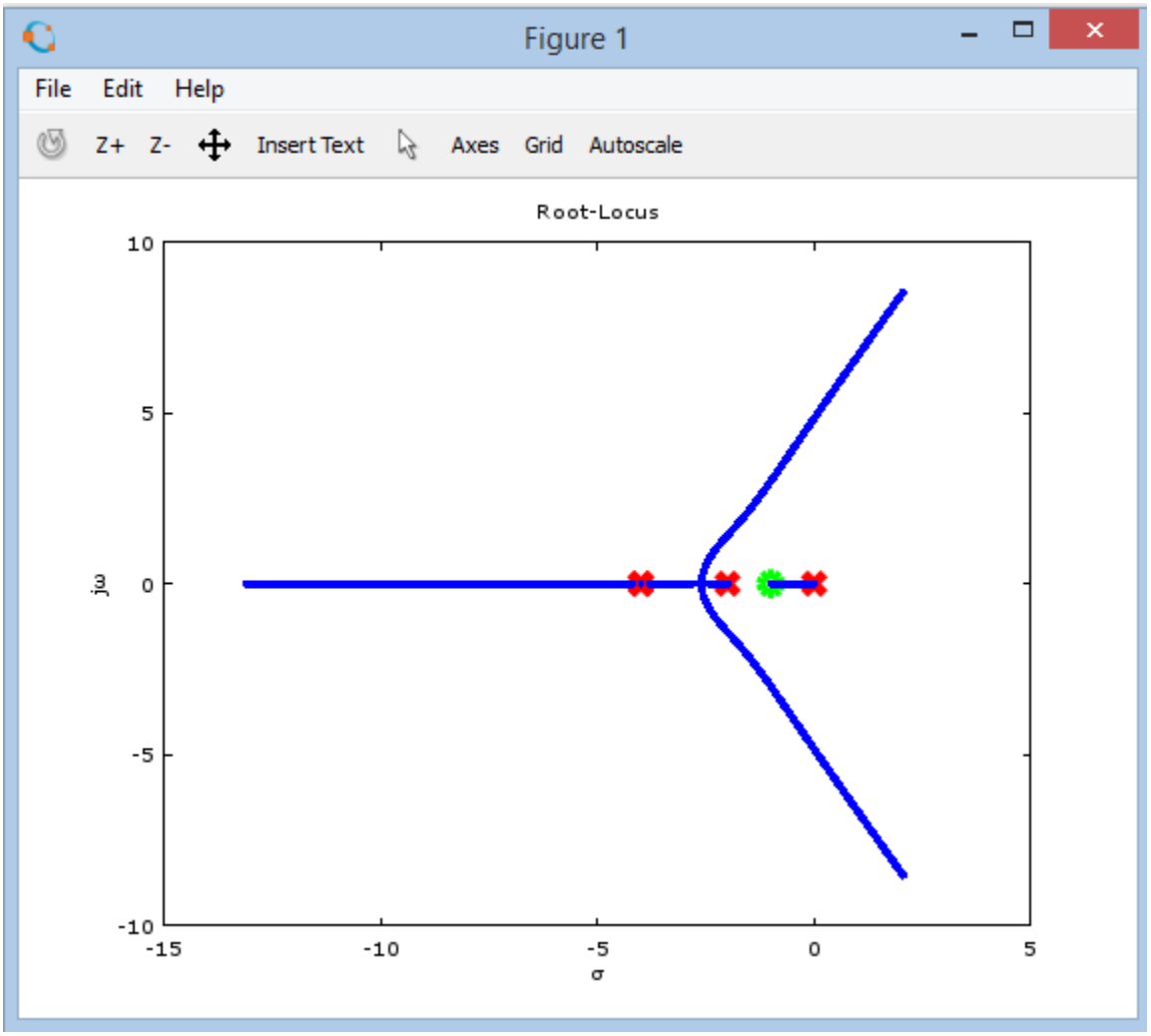
Enter the coefficients of the numerator of J(s): [1 1]
Enter the coefficients of the denominator of J(s): [1 10 32 32 0]
```



Note: *K* is changing from 0 to 1000 with the interval of 0.1