Shane Cincotta, Ronan Tennant

ELEG 305

5/16/19

**Computer Assignment 2**

**Abstract:**

The goals of this assignment are to develop an understand of the behavior of systems modeled by second-order differential equations and learn how to generate Bode plots.

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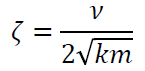
Description automatically generated**Experiment:**

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Description automatically generated To begin, we were given the equation . We are told that *m*=1, . We first solve for H(jw), to do this we reduce the above differential equation to: (jw)2 \* Y(jw) + (v/m) \* jw \* Y(jw) + (k/m) = (k/m) \* X(jw). This then reduces to the form: H(jw) = k / ((jw)2 + (v/m) \* jw + k), since *m* = 1.

We then solved for the value of . Substituting 0 for w in the equation above: : H(j0) = k / ((j0)2 + (v/m) \* j0 + k) = 1, 20\*log(1) = 0.

 We then solved for the value of for large values of w (∞). H(j\*∞) = k / ((j∞)2 + (v/m) \* j∞ + k) = 0. Thus = 20\*log(0) / log(∞) = 20.

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Description automatically generated Continued, we chose 3 different values of k (0.09, 1, 4) and determined the coefficients of the numerator and denominator in H(jw). For the first value of k (0.09), we need to find the value of *v*. We can use the relations and to solve for *v*. Using k=0.09 and *m*=1, we can find *v*. For k=0.09, v=0.6/21/2. Plugging these values into our H(jw) equation, we see that the coefficient of the numerator is simply 0.09, and the coefficients of the denominator are 1, 0.6/21/2 and 0.09.

For the second value of k(1), we again found the value of *v* using the same equation as before, but with a different k (and thus a different v) value. With k=1, v=4/21/2. The coefficient of the numerator was 1, and the coefficients of the denominator were 1, 2/21/2 and 1.

For the third value of k(4), we again found the value of *v* using the same equation as before, but with a different k (and thus a different v) value. With k=4, v=4/21/2. The coefficient of the numerator was 4, and the coefficients of the denominator were 1, 4/21/2 and 4.