chapter12_2_7 Modeling in the Frequency Domain for Example 12.5

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%
% Chapter 12: Modeling in the Frequency Domain
%
% Example 12.5  The mechanical rotating system is treated,
%specifically a gearing system

'Example 12.5: rotational systems driven by gear'       % Display label.
syms s N1 J1 D1 K1 N2 J2 D2 K2  % Construct symbolic objects for
frequency
                    % variable 'N1', 'J1', 'D1', 'K1', 'N2',
                    % 'J2', 'D2', and 'K2'
N1=1E+3; J1=2; D1=2; K1=1;     % Values of variables
N2=2E+3; J2=3; D2=4; K2=2;     % Values of variables
Je=J1*(N2/N1)^2+J2           % Reflect the moment of inertia to the output.
De=D1*(N2/N1)^2+D2            % Reflect the viscous friction to the output.
Ke=K1*(N2/N1)^2+K2           % Reflect the stiffness to the output.
Teta=(N2/N1)            % Output: angular ratio
Torque=(Je*s^2+De*s+Ke)       % Input: total torque reflected to the output
I2=Teta/Torque;           % Use I2(s) initially.
I2=simplify(I2);          % Reduce complexity of I2(s).
G=I2;                 % Form transfer function, G(s) = I2(s).
'G(s)'               % Display label.
pretty(G)              % Pretty print G(s).
pause
```