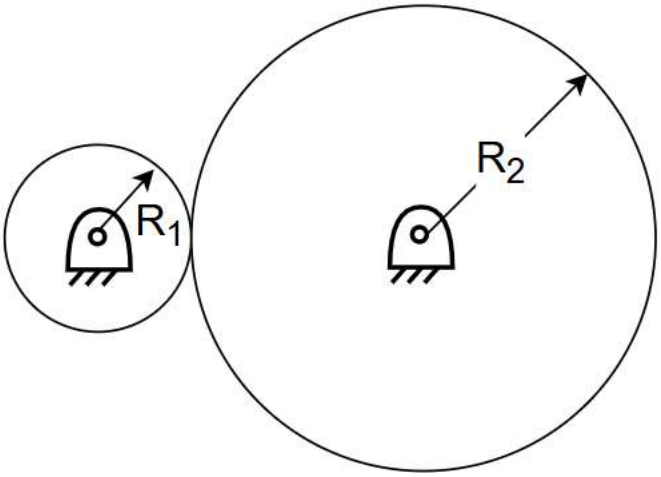
Section 2 Example Statements

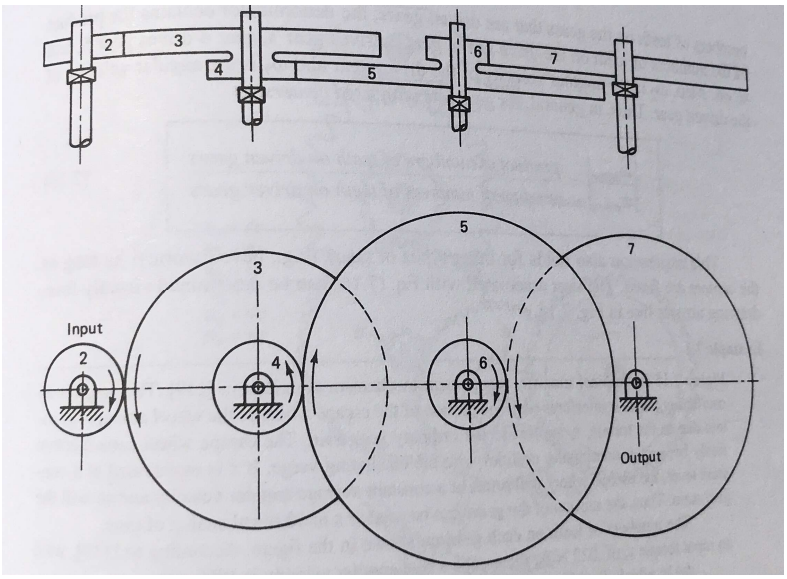
Wednesday, January 29, 2025 9:17 AM

Example 2.1: Find the modulus for the following transformers:

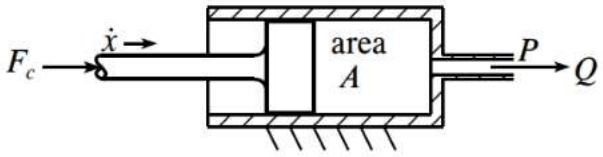
a.



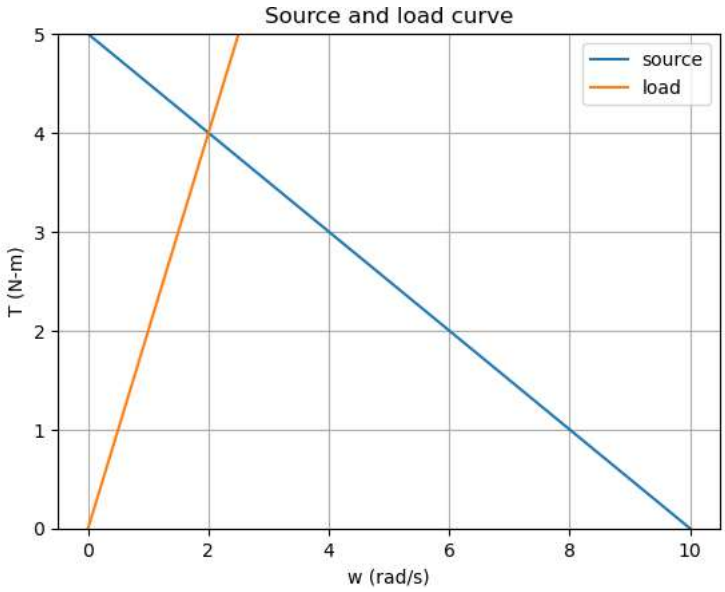
b.



c.

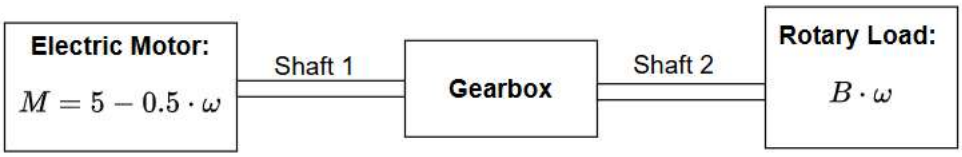


Example 2.2: Reconsider example 1.2 with a gear box between the motor and rotary load. The motor has the following torque speed relationship: $M = 5 - 0.5 \cdot \omega$, where torque is in N-m and ω is in rad/s. The linear torsional damping coefficient is $B = 2 \cdot N \cdot m \cdot s$. The source and load curve plots from example 1.2 are repeated below.



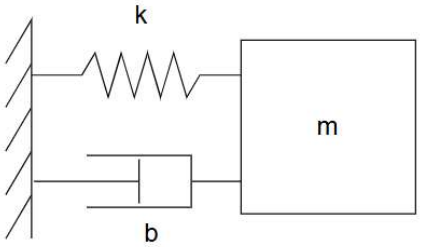
Complete the following:

a. Create a bond graph model of the system (which is summarized schematically below) with the effort and flow variables labeled



b. Find the transformer modulus that leads to the maximum speed on shaft 2 (load speed).

Example 2.3: Find a set of state variable equations for the following system. Let k = 15, m = 10, and b = 8. Assume that an input force pulls the mass to the right. Numerically solve the state variable equations. Then, use conservation of energy to verify the results.



- **Example2.4**: Consider an the figure below in which a rack and pinion is driven by an electric motor. Assume that the shaft between the motor and the pinion has a stiffness, K_s.