

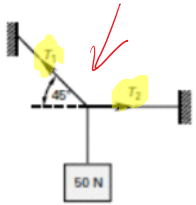
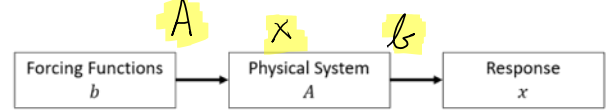
Linear Algebra

Wednesday, July 1, 2020 2:57 PM

Solving a linear algebra problem:

- 1) Analyze the system holistically. What type of system are you analyzing (electrical, mechanical, structural, chemical, etc.)?
- 2) Apply the relevant engineering laws/first principles to obtain a series of equations.
- 3) Put the equations in $Ax = b$ form.
- 4) Solve by hand or in MATLAB.
- 5) Apply a series of test cases to check your results.

$$Ax = b: \begin{bmatrix} & \end{bmatrix} \begin{bmatrix} & \end{bmatrix} = \begin{bmatrix} & \end{bmatrix}$$



Force Balance in the x and y directions:

$$\begin{aligned} \sum F_x = 0 &\rightarrow T_1 \cos 45 - T_2 = 0 \quad (\text{Eq. 1}) \\ \sum F_y = 0 &\rightarrow T_1 \sin 45 - W = 0 \quad (\text{Eq. 2}) \end{aligned}$$

$$\begin{aligned} T_1 \cos 45 - T_2 &= 0 \\ T_1 \sin 45 + 0T_2 - W &= 0 \end{aligned} \rightarrow \begin{aligned} T_1 \cos 45 - T_2 &= 0 \\ T_1 \sin 45 + 0T_2 &= W \end{aligned}$$

$$\begin{bmatrix} \cos 45 & -1 \\ \sin 45 & 0 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \end{bmatrix} = \begin{bmatrix} 0 \\ W \end{bmatrix}$$

$A \quad \quad \quad x \quad \quad \quad b$