LINEAR SYSTEMS OF THE FORMS FIX = Xx: Ax = xx

where I is a Scalar

$$\lambda x - Ax = 0$$

$$(\lambda - A)x = 0$$

$$(\lambda I - A)x = 0$$

Problem: The linear system N1 + 3×2 = /x1 AXI + 5X5 = YX5

can be written in motion form

$$\begin{bmatrix} 1 & 3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \lambda \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

$$A = \begin{bmatrix} 1 & 3 \\ 4 & 2 \end{bmatrix}$$
 and  $x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$ 

This system can be written as

$$\begin{bmatrix} \lambda - 1 & -3 \\ -4 & \lambda - 2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$\lambda I - A = \begin{bmatrix} \lambda - 1 & -3 \\ -4 & \lambda - 2 \end{bmatrix}$$

The value of is called a characteristic valve or an eigenvalue

This system can be weither as

$$A = \begin{bmatrix} 1 & 3 \\ 4 & 2 \end{bmatrix} \text{ and } A = \begin{bmatrix} N_1 \\ N_2 \end{bmatrix} \qquad det(\lambda I - A) = 0$$
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$$A = \begin{bmatrix} 1 & 3 \\ 4 & 2 \end{bmatrix} \begin{bmatrix} N_1 \\ N_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \qquad (\lambda - 1)(\lambda - 2) - (-4)(-3) = 0$$

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