UNIT 2 – ORTHOGONAL TRANSFORMATION OF A REAL SYMMETRIC MATRIX

Nature of the quadratic form

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Find rank, index, signature and nature

$$2x_1^2 + 2x_2^2 + x_3^2 + 4x_1x_2 = 0$$

The matrix form is

$$\begin{array}{cccc} 2 & 2 & 0 \\ A = \begin{bmatrix} 2 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Characteristic equation ,Eigen values,Eigen vectors

C1 =Sum of leading diadonal elements

=2+2+1 =5

C₂= Sum of minors of leading diagonal elements

=4

 $C_3 = |A|$

The characteristic equation is

$$\lambda^3 - 5\lambda^2 + 4\lambda = 0$$

The eigen values are 0,1,4

The index p=2

Rank r=2

Signature s=2p-r =2

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Nature of the quadratic form

The nature is semi positive