

• EC. GENERAL CÓNICA:

$$a_{11}x^2 + a_{22}y^2 + a_{33}z^2 + 2a_{12}xy + 2a_{13}xz + 2a_{23}yz + 2a_{10}x + 2a_{20}y + 2a_{30}z + a_{00} = 0$$

• MATRIZ ASOCIADA:

$$A = \begin{pmatrix} a_{00} & a_{01} & a_{02} & a_{03} \\ a_{10} & a_{11} & a_{12} & a_{13} \\ a_{20} & a_{21} & a_{22} & a_{23} \\ a_{30} & a_{31} & a_{32} & a_{33} \end{pmatrix} \quad (\text{simétrica})$$

• EXPRESIÓN MATRICIAL:

$$(1 \ x \ y \ z)A(1 \ x \ y \ z)^t = 0$$

• INVARIANTE PROYECTIVO:

$$|A| = \det(A)$$

• INVARIANTE AFÍN:

$$K = |A_{00}|$$

• INVARIANTE CUADRÁTICO:

$$J = \begin{vmatrix} a_{11} & a_{21} \\ a_{12} & a_{22} \end{vmatrix} + \begin{vmatrix} a_{11} & a_{31} \\ a_{13} & a_{33} \end{vmatrix} + \begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix}$$

• INVARIANTE MÉTRICO:

$$I = a_{11} + a_{22} + a_{33}$$

Si  $|A| = K = 0$

$$J' = \begin{vmatrix} a_{00} & a_{01} \\ a_{10} & a_{11} \end{vmatrix} + \begin{vmatrix} a_{00} & a_{02} \\ a_{20} & a_{22} \end{vmatrix} + \begin{vmatrix} a_{00} & a_{03} \\ a_{30} & a_{33} \end{vmatrix}$$

$$I' = A_{11} + A_{22} + A_{33}$$

• ECUACIÓN CARACTERÍSTICA:

$$s^3 - Is^2 + Js - K = 0$$

SIGNATURA:

$$\text{sig}(A) = |\#s_i \text{ positiva} - \#s_i \text{ negativa}|$$

$K \neq 0$

$$\text{sig}(A) = 3$$

$$|A| > 0$$

Elipsoide Real

$$|A| < 0$$

Elipsoide Imaginario

$$|A| = 0$$

Cono Imaginario

$$\text{sig}(A) = 1$$

$$|A| > 0$$

Hiperboloide Hiperbólico

$$|A| < 0$$

Hiperboloide Elíptico

$$|A| = 0$$

Cono Real

youtube.com/jmsreales

notodosmatematicas.es

• EC. REDUCIDA:

$$s_1X^2 + s_2Y^2 + s_3Z^2 + \frac{|A|}{K} = 0$$

• EC. CANÓNICA:

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} \pm \frac{z^2}{c^2} = 1$$

• Elipsoide/  
Hiperboloide:

• Paraboloides  
( $s_3 = 0$ ):

• Cono:

• Cilindro elíptico/  
hiperbólico:

• Cilindro parabólico:

$$s_1X^2 + s_2Y^2 \pm 2\sqrt{\frac{-|A|}{J}}Z = 0$$

$$s_1X^2 + s_2Y^2 + s_3Z^2 = 0$$

$$s_1X^2 + s_2Y^2 + \frac{I'}{J} = 0$$

$$s_1Y^2 \pm 2\sqrt{\frac{-I'}{I}}X = 0$$

$$\frac{x^2}{a^2} \pm \frac{y^2}{b^2} - 2cz = 0$$

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} \pm \frac{z^2}{c^2} = 0$$

$$\frac{x^2}{a^2} \pm \frac{y^2}{b^2} = 1$$

$$y^2 - 2px = 0$$

$K = 0$		
$ A  \neq 0$	$J > 0$	Paraboloides Elíptico
	$J < 0$	Paraboloides Hiperbólico
$ A  = 0$	$J > 0$	$I' \neq 0$ $\text{signo}(I') = \text{signo}(I)$ $I' \neq 0$ $\text{signo}(I') \neq \text{signo}(I)$
		$I' = 0$
	$J < 0$	$I' \neq 0$
		$I' = 0$
	$J = 0$	$I' \neq 0$
	$I \neq 0$	$I' = 0, J' > 0$ $I' = 0, J' < 0$ $I' = 0, J' = 0$
		Par de planos imaginarios paralelos Par de planos reales paralelos Par de planos coincidentes