Ampliación de Matemáticas 2: Formulario*

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1. Cambio de Variable

Jacobiano

$$J(T) = abs\left(det\begin{pmatrix} \frac{\partial x}{\partial u} & \frac{\partial x}{\partial v} & \frac{\partial x}{\partial w} \\ \frac{\partial y}{\partial u} & \frac{\partial y}{\partial v} & \frac{\partial y}{\partial w} \\ \frac{\partial z}{\partial u} & \frac{\partial z}{\partial v} & \frac{\partial z}{\partial w} \end{pmatrix}\right)$$

Coordenadas Esféricas

$$T : \begin{cases} x & = r \cdot sen(\alpha) \cdot cos(\beta) \\ y & = r \cdot sen(\alpha) \cdot sen(\beta) \\ z & = r \cdot cos(\alpha) \end{cases}$$

$$J(T) = r^2 \cdot sen(\alpha)$$

$$r > 0 \qquad \alpha \in [0, \pi] \qquad \beta \in [0, 2\pi]$$

Coordenadas Cilíndricas

$$T : \begin{cases} x & = r \cdot cos(\alpha) \\ y & = r \cdot sin(\alpha) \\ z & = z \end{cases}$$

$$J(T) = r$$

$$r \geq 0 \qquad \alpha \in [0, 2\pi] \qquad z \in R$$

2. Integral Impropia

Criterios de Comparación

$$B := \text{Interior de bola de radio 1 centrada en 0}$$
$$B^* := \text{Exterior de bola de radio 1 centrada en 0}$$
$$r = \sqrt{x_1^2 + ... + x_n^2}$$

$$\int_B r^{-\alpha} dx_1...dx_n \begin{cases} \alpha < n & convergente \\ \alpha \geq n & divergente \end{cases}$$

$$\int_{B^*} r^{-\alpha} dx_1...dx_n \begin{cases} \alpha > n & convergente \\ \alpha \leq n & divergente \end{cases}$$

3. Ecuación en Diferencias

Solución Particular del problema homogéneo

$$\{k^n r^k\} = \{k^n \rho^k cos(\theta k)\}$$
$$\{k^n \bar{r}^k\} = \{k^n \rho^k sin(\theta k)\}$$

Solución Particular del problema no homogéneo

$$b_k = \rho^k (P_p(k) cos(\theta k) + Q_q(k) sin(\theta k))$$
$$z_k = k^s \rho^k (P_m^*(k) cos(\theta k) + Q_m^*(k) sin(\theta k))$$

b_k	z_k
C	A
k^t	$A_t k^t + ... + A_1 k^1 + A_0$
C^k	AC^k
$k^t C^k$	$C^k(A_t k^t + ... + A_1 k^1 + A_0)$
$sin(\theta k)$	$Acos(\theta k) + Bsin(\theta k)$
$cos(\theta k)$	$Acos(\theta k) + Bsin(\theta k)$

4. Métodos Numéricos

Integración Numérica

$$I(f) = \sum_{k=0}^{n} \left(\int_a^b l_k(x) dx \right) f(x_k) + \int_a^b \frac{1}{(n+1)!} f^{(n+1)} f(\xi) \omega_(x)$$

$$I_{pm}^c(f) = 2h \sum_{k=0}^{n/2} f(x_{2k}) + \frac{1}{6}(b-a)h^2 f^{(2)}(\xi)$$

$$I_{tr}^c(f) = \frac{1}{2} h (f(x_0) + 2 \sum_{k=1}^{2n-1} f(x_k) + f(x_{2n})) + \frac{1}{12}(b-a)h^2 f^{(2)}(\xi)$$

$$I_{si}^c(f) = \frac{1}{3}(f(x_0) + 4 \sum_{k=1}^{n} f(x_{2k-1})) + 2 \sum_{k=1}^{2n-1} f(x_{2k}) + \frac{1}{180}(b-a)h^4 f^{(4)}(\xi)$$

A. Trigonometría

Valores de Referencia

$$sin(0) = 0 \quad sin\left(\frac{\pi}{6}\right) = \frac{1}{2} \quad sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2} \quad sin\left(\frac{\pi}{2}\right) = 1$$
$$cos(0) = 1 \quad cos\left(\frac{\pi}{6}\right) = \frac{\sqrt{3}}{2} \quad cos\left(\frac{\pi}{3}\right) = \frac{1}{2} \quad cos\left(\frac{\pi}{2}\right) = 0$$

Igualdades Trigonométricas

$$sin(a+b) = sin(a)cos(b) + sen(b)cos(a)$$
$$cos(a+b) = cos(a)cos(b) - sen(b)sen(a)$$

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* https://github.com/garciparedes/amat2-cheatsheet