

1. TABLAS

1.1. p=2

h	Error Norma 2	Error Norma infinito	Tiempo de ejecución(ns)
10	$1,2305e-04$	$5,5000e-05$	1150300
20	$1,1180e-05$	$4,0000e-06$	1979700
40	$2,8284e-06$	$1,0000e-06$	3639500
80	$1,4142e-06$	$1,0000e-06$	5977700

1.2. p=3

IMPORTANTE: puntos de control no exactos, limitan la convergencia.

h	Norma 2	Norma infinito	Tiempo de ejecución(ns)
10	$3,4581e-04$	$1,5000e-04$	1162900
20	$4,8552e-04$	$1,6100e-04$	1996300
40	$6,8807e-04$	$1,6100e-04$	3986400

1.3. p=4

h	Norma 2	Norma infinito	Tiempo de ejecución(ns)
10	$1,4142e-06$	$1,0000e-06$	1409000
20	$1,4142e-06$	$1,0000e-06$	3111600
40	$1,2247e-16$	$1,2247e-16$	4555700
80	$1,2247e-16$	$1,2247e-16$	9696100

2. CAMBIO DE VARIABLE 1D

2.1. Formulaci3n clasica

Espacio parametrico:

$$-u''(x) = f(x), \quad x \in \Omega.$$

Espacio fisico:

$$-\frac{1}{J(\xi)} \frac{d}{d\xi} \left(\frac{1}{J(\xi)} u'(r(\xi)) \right) = f(r(\xi)), \quad \xi \in \Omega^\xi.$$

Equivalentemente:

$$-\frac{d}{d\xi} \left(\frac{1}{J(\xi)} u'(r(\xi)) \right) = f(r(\xi))J(\xi), \quad \xi \in \Omega^\xi.$$

2.2. Formulaci3n variacional

suponemos $\Omega = (0, L)$, spg

Espacio parametrico:

$$\int_{\Omega} u'(x)v'(x)dx - u'(L)v(L) + u'(0)v(0) = \int_{\Omega} f(x)v(x)dx, \quad x \in \Omega.$$

Espacio fisico:

$$\begin{aligned} & \int_{\Omega^\xi} \frac{1}{J(\xi)} u'(r(\xi)) \frac{1}{J(\xi)} v'(r(\xi)) J(\xi) d\xi - \frac{1}{J(L)} u'(r(L))v(r(L)) + \frac{1}{J(0)} u'(r(0))v(r(0)) = \\ & = \int_{\Omega^\xi} f(r(\xi))v(r(\xi))J(\xi) d\xi, \quad \xi \in \Omega^\xi. \end{aligned}$$

Simplificando obtenemos:

$$\begin{aligned} & \int_{\Omega^\xi} \frac{1}{J(\xi)} u'(r(\xi))v'(r(\xi))d\xi - \frac{1}{J(L)} u'(r(L))v(r(L)) + \frac{1}{J(0)} u'(r(0))v(r(0)) = \\ & = \int_{\Omega^\xi} f(r(\xi))v(r(\xi))J(\xi) d\xi, \quad \xi \in \Omega^\xi. \end{aligned}$$

Donde $J(\xi) = |r'(\xi)|_2$.