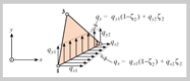
LECCION 4 - EJERCICIO 4 (15.4) v.2005

INICIO

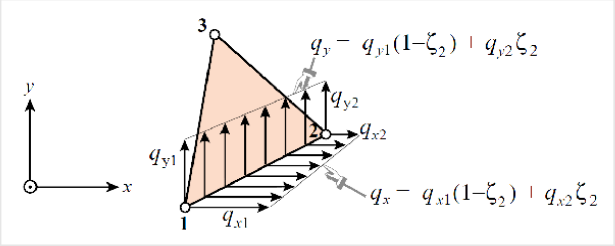
```
Off[General::"spell1"]
Off[General::"spell"]
```

DEFINICION LADO 1-2 DEL TRIANGULO

$\zeta 3 = 0, \zeta 2 = 1 - \zeta 1$

CdL =  ;

```
Show[CdL, ImageSize → 300]
```



DEFINICION CARGA DISTRIBUIDA EN LADO 1-2 DEL TRIANGULO

```
qx = qx1 * (1 - ζ2) + qx2 * ζ2;
```

```
qy = qy1 * (1 - ζ2) + qy2 * ζ2;
```

SUPONEMOS DESPLAZAMIENTOS EN LADO 1-2 DEL TRIANGULO

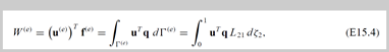
```
ux = ux1 * (1 - ζ2) + ux2 * ζ2;
```

```
uy = uy1 * (1 - ζ2) + uy2 * ζ2;
```

LONGITUD DEL LADO 1-2

$L12 = \sqrt{x21^2 + y21^2}$

CALCULO DEL TRABAJO DE LA FUERZA APLICADA EN LADO 1-2

TfL =  ;

```
Show[TfL, ImageSize → 500]
```

$$W^{(e)} = \left(\mathbf{u}^{(e)}\right)^T \mathbf{f}^{(e)} = \int_{\Gamma^{(e)}} \mathbf{u}^T \mathbf{q}\, d\Gamma^{(e)} = \int_0^1 \mathbf{u}^T \mathbf{q}\, L_{21}\, d\zeta_2, \qquad \text{(E15.4)}$$

VECTOR DESPLAZAMIENTOS EN UN PUNTO

```
u = {ux, uy};
```

```
Dimensions[u]
```

```
{2}
```

VECTOR FUERZA APLICADA EN UN PUNTO

```
q = {qx, qy};
```

```
Dimensions[q]
```

```
{2}
```

TRABAJO FUERZA APLICADA

```
u.q
```

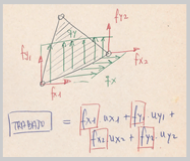
$$(qx1\ (1-\xi 2)+qx2\ \xi 2)\ (ux1\ (1-\xi 2)+ux2\ \xi 2)+(qy1\ (1-\xi 2)+qy2\ \xi 2)\ (uy1\ (1-\xi 2)+uy2\ \xi 2)$$

```
We = Simplify[L21 * Integrate[u.q, {ξ2, 0, 1}]]
```

$$\frac{1}{6}\,L21\ (qx1\ (2\,ux1+ux2)+qx2\ (ux1+2\,ux2)+2\,qy1\,uy1+qy2\,uy1+qy1\,uy2+2\,qy2\,uy2)$$

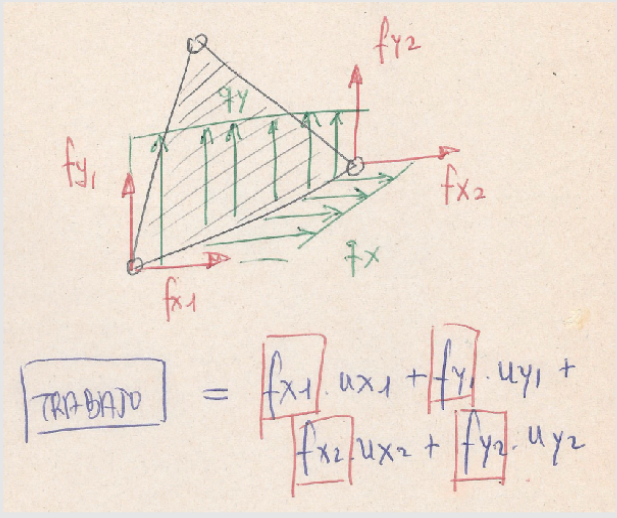
DEFINICION TRABAJO UTILIZANDO FUERZAS NODALES CONSISTENTES

```
FnC =
```



```
;
```

```
Show[FnC, ImageSize → 300]
```



VECTOR FUERZAS NODALES CONSISTENTES

```
fnc = {fx1, fy1, fx2, fy2};
```

VECTOR FUERZAS NODALES

```
ue = {ux1, uy1, ux2, uy2};
```

TRABAJO FUERZAS NODALES CONSISTENTES

```
Wefn = fnc.ue
```

$$fx1\ ux1 + fx2\ ux2 + fy1\ uy1 + fy2\ uy2$$

ASIGNACION DE VALORES FUERZAS NODALES CONSISTENTES

```
fx1 = ∂ux1 We
```

$$\frac{1}{6} L21\ (2\ qx1 + qx2)$$

```
fy1 = ∂uy1 We
```

$$\frac{1}{6} L21\ (2\ qy1 + qy2)$$

```
fx2 = ∂ux2 We
```

$$\frac{1}{6} L21\ (qx1 + 2\ qx2)$$

```
fy2 = ∂uy2 We
```

$$\frac{1}{6} L21\ (qy1 + 2\ qy2)$$