Matlab
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$u(x)$
$\frac{\mathrm{d}\sigma}{\mathrm{d}x}+q(x)=\frac{\mathrm{d}}{\mathrm{d}x}\left(EA\frac{\mathrm{d}u}{\mathrm{d}x}\right)+q(x)=0$
(1)
E
A
a
$q(x)$
$u(x)$
$(0,L)$
ó
??
1/1D.pdf*Definicindelproblemaysuscondicionesdecontorno.*
Tipo
Dirich-
let
o
Es-
en-
ciales
$u(x)$
$u(0)=u_0$

$u(L)=u_g$

Tipo
Neu-
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Nat-
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rales
$t=E\frac{\mathrm{d}u}{\mathrm{d}x}_{x=L}$

fuerzas
volumétri-
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$q(x)$
ó
$A(x)$
ó
é
e
$q(x)=A(x)\rho(x)g$

$q(x)$

$(0, L)$
$u(x)$
$y \in$
$(0, L)$

$$A \int_y^L \frac{\mathrm{d}\sigma}{\mathrm{d}x} \mathrm{d}x = -\int_y^L q(x) \mathrm{d}x \quad (2)$$

$$\sigma(L) - \sigma(y) = -\frac{1}{A} \int_y^L q(x) \quad (3)$$

$\sigma =$
$E u_{,x}$

$$E \frac{\mathrm{d}u(y)}{\mathrm{d}y} = E \frac{\mathrm{d}u}{\mathrm{d}x}_{x=L} + \frac{1}{A} \int_y^L q(x) \mathrm{d}x$$
(4)
$z \in$
$(0, L)$

$$\int_0^z E \frac{\mathrm{d}u(y)}{\mathrm{d}y} \mathrm{d}y = \int_0^z \left(E \frac{\mathrm{d}u}{\mathrm{d}x}_{x=L} + \frac{1}{A} \int_y^L q(x) \mathrm{d}x \right) \mathrm{d}y$$
(5)
E
u
$z =$
L

$$Eu(z) - Eu(0) = E \frac{\mathrm{d}u}{\mathrm{d}x}_{x=L} z + \frac{1}{A} \int_0^z \int_y^L q(x) \mathrm{d}x \mathrm{d}y$$
(6)
$u(z)$

$$u(z) = u(0) + \frac{\mathrm{d}u}{\mathrm{d}x}_{x=L} z + \frac{1}{EA} \int_0^z \int_y^L q(x) \mathrm{d}x \mathrm{d}y$$
(7)
$u(0)$

$\frac{\mathrm{d}u}{\mathrm{d}x}_{x=L}$
$z =$
L

$\frac{\mathrm{d}u}{\mathrm{d}x}_{x=L}$
$z =$
L
$u(L)$
$u(0) =$
0
$EA\mathrm{d}u/\mathrm{d}x|L =$
P
P
$z =$
L
$q(x) =$
$q0 +$
rx
Dicha resolución ha de ser realizada por los alumnos.
$E(x)$
$f(x)$
$w(x)$

$$\int_0^L w \frac{\mathrm{d}}{\mathrm{d}x} \left(EA \frac{\mathrm{d}u}{\mathrm{d}x} \right) \mathrm{d}x + \int_0^L wq \mathrm{d}x = 0$$
(8)

$$\frac{\mathrm{d}}{\mathrm{d}x} \left[w \cdot EA \frac{\mathrm{d}u}{\mathrm{d}x} \right] = \frac{\mathrm{d}w}{\mathrm{d}x} \cdot EA \frac{\mathrm{d}u}{\mathrm{d}x} + w \cdot \frac{\mathrm{d}}{\mathrm{d}x} \left(EA \frac{\mathrm{d}u}{\mathrm{d}x} \right)$$

$$\left[w \cdot EA \frac{\mathrm{d}u}{\mathrm{d}x} \right]_0^L - \int_0^L \frac{\mathrm{d}w}{\mathrm{d}x} \cdot EA \frac{\mathrm{d}u}{\mathrm{d}x} \mathrm{d}x = \int_0^L w \cdot \frac{\mathrm{d}}{\mathrm{d}x} \left(EA \frac{\mathrm{d}u}{\mathrm{d}x} \right) \mathrm{d}x \quad (9)$$

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$$\int_0^L \quad \int_0^L$$

$L =$
10mm
$A =$
1mm^2.
$E =$
1000MPa
$(x =$
0)
$(x =$
$L)$
$P =$
5N,
??
$_1/esquema.pdf Modelo de fibra elstica 1D$
u
$N_{mat} =$
du,
$N_{elem} =$
$9-$
d
$q(x)$,
$x =$
0
$x =$
L,
$q_0 =$
$d/10$ N/mm, $q_L =$
q_0+
$u/10$ N/mm
$u(x)$
$\sigma(x)$
x
$\sigma =$
$E\varepsilon =$
$E\mathrm{d}u/\mathrm{d}x$,
$\sigma^h = Eu_a \mathrm{d}N_a/\mathrm{d}x = E\left(u_2 - u_1\right)/h.\big)$
$u(x)$
`Matlab`
Moo-
dle
`*.m`
script
`MatLab`
`FeBio`
Moo-
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`Matlab`
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