arco circolare isostatico (a tre cerniere): diagrammi delle sollecitazioni

Ipotesi : carico uniformemente ripartito arco a tutto sesto

Parametri in gioco:
p: carico uniformemente ripartito, positivo verso il basso
l : altezza dell'arco (pari a metà della luce), raggio
alpha: coordinata angolare (alpha=0 alla sezione di imposta)

Obiettivo :

```
> restart;
  with(linalg):
```

```
Warning, the protected names norm and trace have been redefined and
unprotected
```

```
> x:= l*(1-cos(alpha));
  y:=l*sin(alpha);
  M:=-p*x^2/2-p*l/2*y+p*l*x;
  M:=simplify(M);
  eq1:=p*l/2-T*cos(alpha)+N*sin(alpha);
  eq2:=p*l-p*x+T*sin(alpha)+N*cos(alpha);
  solve ({eq1, eq2},{N, T});

  N:=-1/2*p*l*sin(alpha)-p*l+p*l*sin(alpha)^2;
  T:=-1/2*cos(alpha)*p*l*(-1+2*sin(alpha));
```

$$x := l\,(1-\cos(\alpha))$$

$$x := l\,(1-\cos(\alpha))$$

$$y := l\sin(\alpha)$$

$$M := -\frac{1}{2}p\,l^2\,(1-\cos(\alpha))^2 - \frac{1}{2}p\,l^2\sin(\alpha) + p\,l^2\,(1-\cos(\alpha))$$

$$M := -\frac{1}{2}p\,l^2\,(-1+\cos(\alpha)^2+\sin(\alpha))$$

$$eq1 := \frac{1}{2}p\,l - T\cos(\alpha) + N\sin(\alpha)$$

$$eq2 := p\,l - p\,l\,(1-\cos(\alpha)) + T\sin(\alpha) + N\cos(\alpha)$$

$$\{N = -\frac{1}{2}p\,l\sin(\alpha) - p\,l + p\,l\sin(\alpha)^2,\ T = -\frac{1}{2}\cos(\alpha)\,p\,l\,(-1+2\sin(\alpha))\}$$

$$N := -\frac{1}{2}p\,l\sin(\alpha) - p\,l + p\,l\sin(\alpha)^2$$

$$T := -\frac{1}{2}\cos(\alpha)\,p\,l\,(-1+2\sin(\alpha))$$

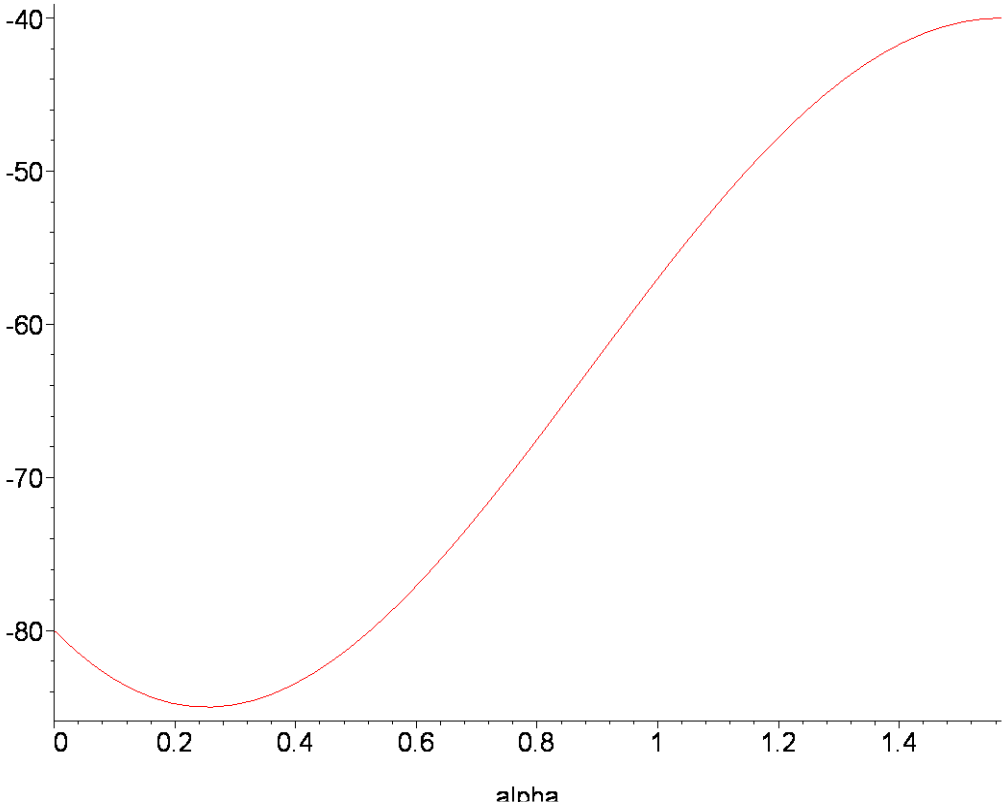
Valutazione Numerica

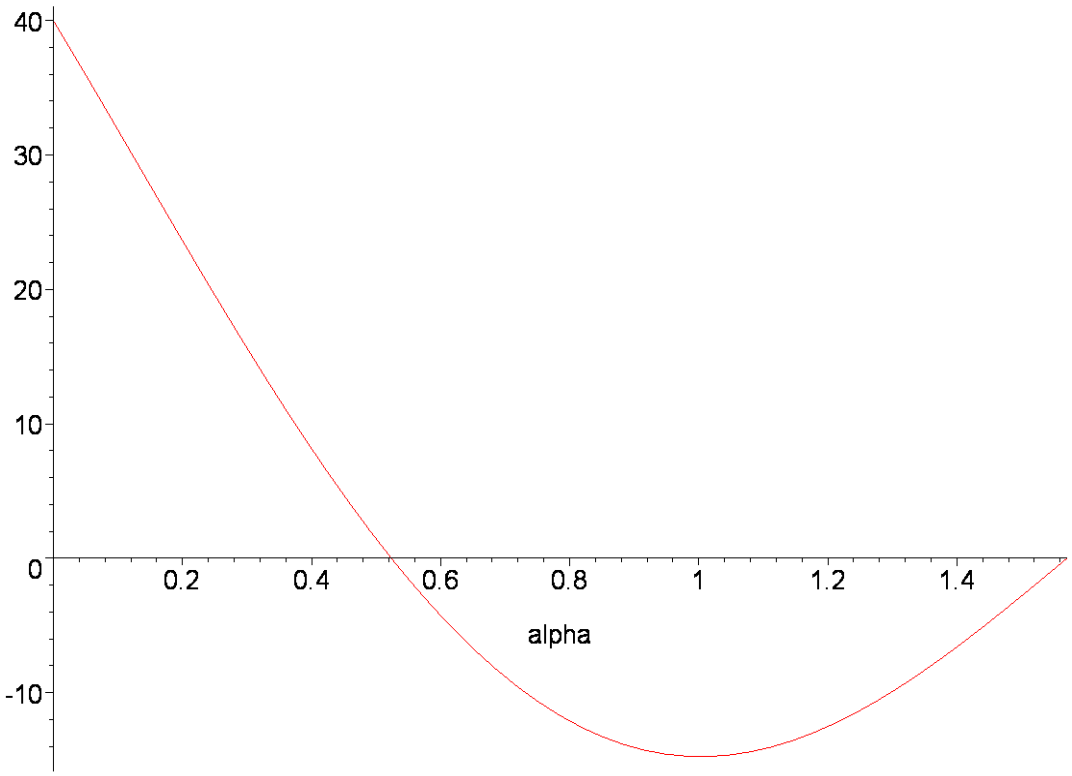
```
> p:=10; l:=8;
```

$$p := 10$$

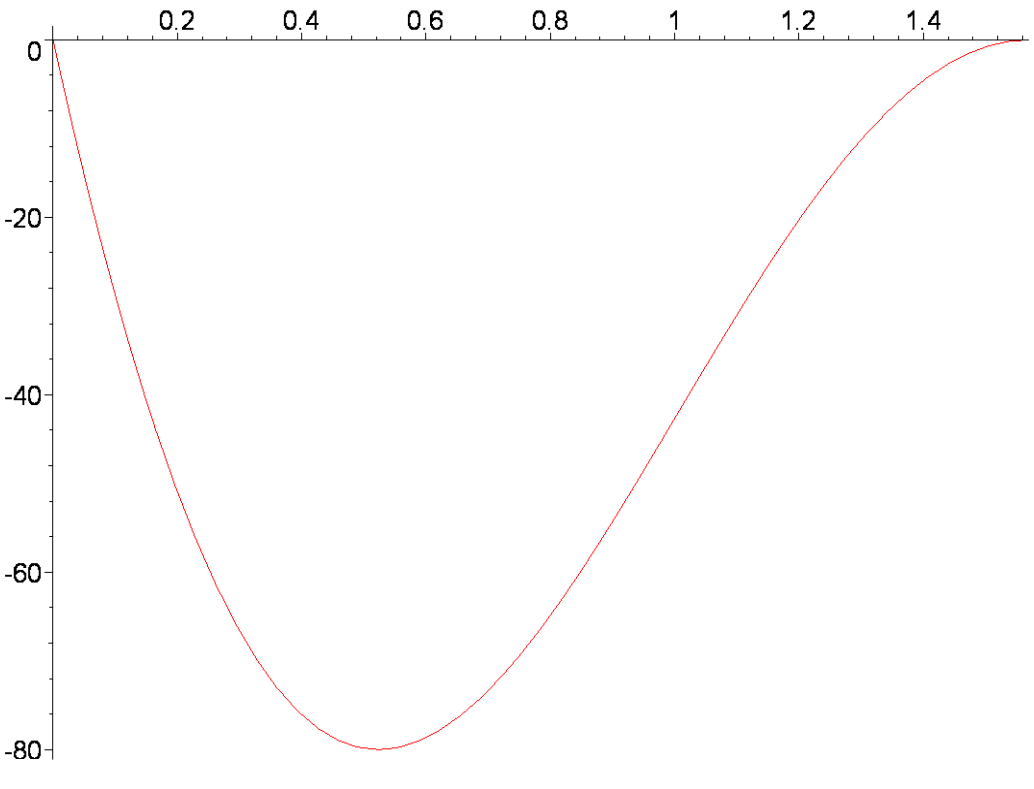
$$l := 8$$

```
> plot(N, alpha=0..Pi/2);

  plot(T, alpha=0..Pi/2);

  plot(M, alpha=0..Pi/2);
```




40
30
20
10
0
-10
0.2
0.4
0.6
0.8
1
1.2
1.4
alpha

alpha


0.2
0.4
0.6
0.8
1
1.2
1.4
0
-20
-40
-60
-80

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