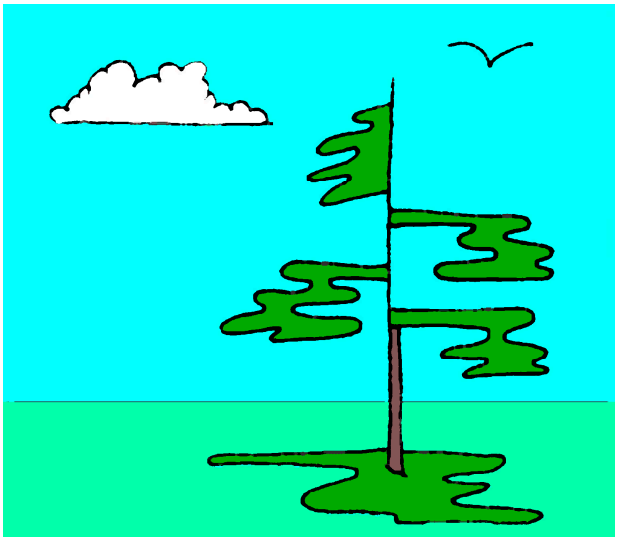
NorthWoods Software



Program Name: FEM_Trapazoidal_Load

Project Name: -

Project Number: -

Project Description: -

Project Designer: Dik

Last Revised (yy-mm-dd): 19-10-04

Reference: KootK

Created using SMath Studio, a MathCAD workalike from https://en.smath.info/view/SMathStudio
The User is responsible to verify data using an alternative method

Menu:

..... Input Data ..... Important Output ..... Logical Constructs **Blue** **Units**

..... Sum / For **Red** **Important Note**

Defined Units:

$K := kip$ $lb := lbf$ Force

$K\_ft := K\ ft$ $kN\_m := kN\ m$ Moment

$pcf := \frac{lbf}{ft^3}$ $kNpcm := \frac{kN}{m^3}$ Density

$Klf := \frac{K}{ft}$ Force per Unit Length

$psf := \frac{lbf}{ft^2}$ $Ksf := \frac{K}{ft^2}$ $kNpsm := \frac{kN}{m^2}$ Pressure

User Defined Functions

```
Check(arg):=if arg = 1
              Check := "...OK"
            else
              Check := "...NG"
```

Examples

$Check(2 = 3) = "...NG"$

$Check(2 \neq 3) = "...OK"$

$Check(2 \leq 3) = "...OK"$

$Check(3 \geq 2) = "...OK"$

Input Data:

Dimensions:

$L := 29\ ft$ Span Length

$s_1 := 0\ ft$ Left Dist to Distributed Load

$s_2 := 29\ ft$ Length of Distributed Load

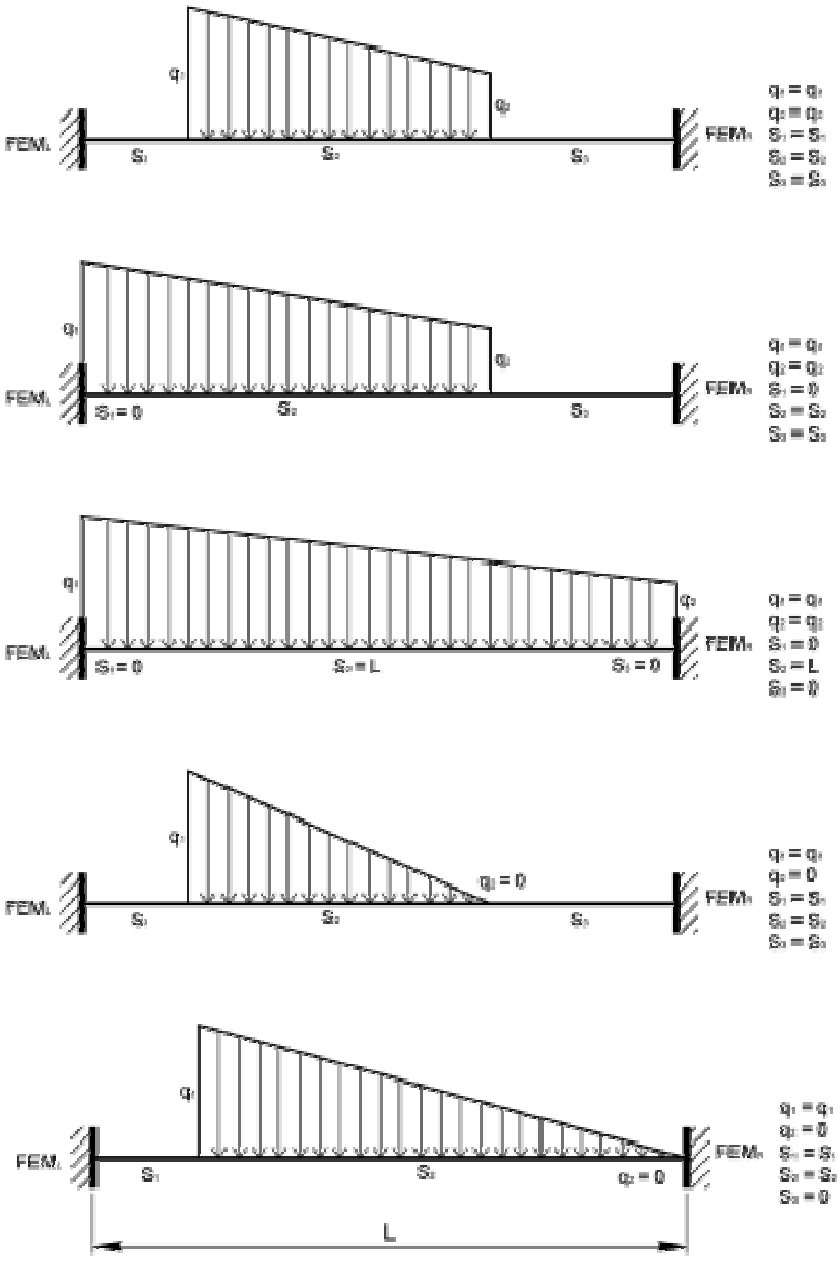
$s_3 := 0\ ft$ Right Dist to Distributed Load

$Check\left(s_1 + s_2 + s_3 = L\right) = "...OK"$

Distributed Loads:

$q_1 := 1.5\ Klf$ Left Magnitude of Distributed Load

$q_2 := 1.5\ Klf$ Right Magnitude of Distributed Load



Calculations:

$FEM_A := \frac{1}{60} \cdot q_2 \cdot s_2$ $\quad FEM_A = 0.73\ K$

$FEM_B := \frac{1}{60} \cdot q_1 \cdot s_2$ $\quad FEM_B = 0.73\ K$

$CD := \left(s_1 + s_2 + s_3\right)^2$ $\quad CD = 841\ ft^2$

$FEM_{R1} := \left(3 \cdot {s_2}^3 + 15 \cdot {s_2}^2 \cdot s_3 + 10 \cdot {s_1}^2 \cdot s_2 + 30 \cdot {s_1}^2 \cdot s_3 + 10 \cdot {s_2}^2 \cdot s_1 + 40 \cdot s_1 \cdot s_2 \cdot s_3\right)$

$FEM_{R1} = 73167\ ft^3$

$FEM_{R2} := \left(2 \cdot {s_2}^3 + 5 \cdot {s_2}^2 \cdot s_3 + 20 \cdot {s_1}^2 \cdot s_2 + 30 \cdot {s_1}^2 \cdot s_3 + 10 \cdot {s_2}^2 \cdot s_1 + 20 \cdot s_1 \cdot s_2 \cdot s_3\right)$

$FEM_{R2} = 48778\ ft^3$

$FEM_{L1} := \left(3 \cdot {s_2}^3 + 15 \cdot {s_2}^2 \cdot s_1 + 10 \cdot {s_3}^2 \cdot s_2 + 30 \cdot {s_3}^2 \cdot s_1 + 10 \cdot {s_2}^2 \cdot s_3 + 40 \cdot s_1 \cdot s_2 \cdot s_3\right)$

$FEM_{L1} = 73167\ ft^3$

$FEM_{L2} := \left(2 \cdot {s_2}^3 + 5 \cdot {s_2}^2 \cdot s_1 + 20 \cdot {s_3}^2 \cdot s_2 + 30 \cdot {s_3}^2 \cdot s_1 + 10 \cdot {s_2}^2 \cdot s_3 + 20 \cdot s_1 \cdot s_2 \cdot s_3\right)$

$FEM_{L2} = 48778\ ft^3$

$FEM_R := \left(-FEM_A \cdot \frac{FEM_{R1}}{CD} - FEM_B \cdot \frac{FEM_{R2}}{CD}\right)$ $\quad FEM_R = -105.1\ K\_ft$

$FEM_L := FEM_B \cdot \frac{FEM_{L1}}{CD} + FEM_A \cdot \frac{FEM_{L2}}{CD}$ $\quad FEM_L = 105.1\ K\_ft$

$M := q_1 \cdot \frac{L^2}{12}$ $\quad M = 105.1\ K\_ft$