Continues Beam Analysis (Metrix Stiffness Method)

This code adopt from Prof. Fredy Gabriel Ramírez Villanueva repository:
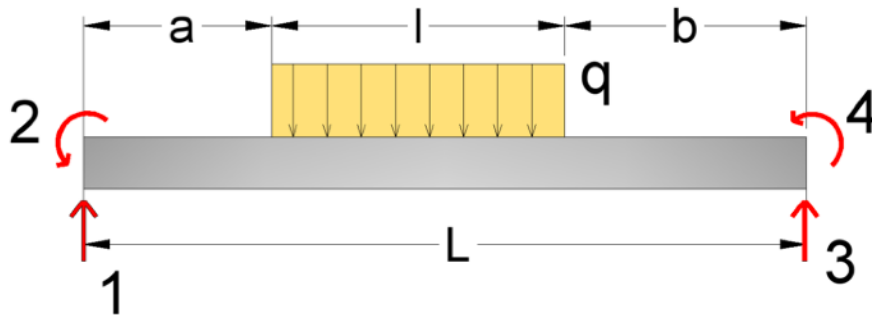- https://github.com/SirPrime/MatrixAnalysis-Beams.git
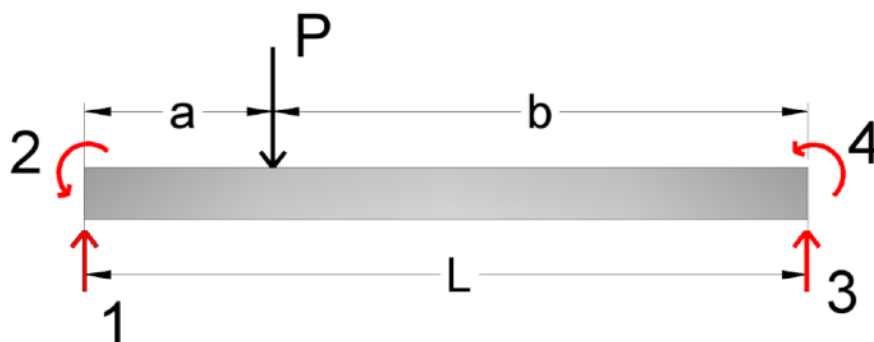
Tutorial for matrix stiffness method:
- www.youtube.com/watch?v=hCmXwMQWafk&list=LL&index=6&t=3642s
- https://www.erbakan.edu.tr/storage/files/department/insaatmuhendisligi/editor/DersSayfalari/YapSt2/06_Matrix_Beam.pdf

Line load definition:

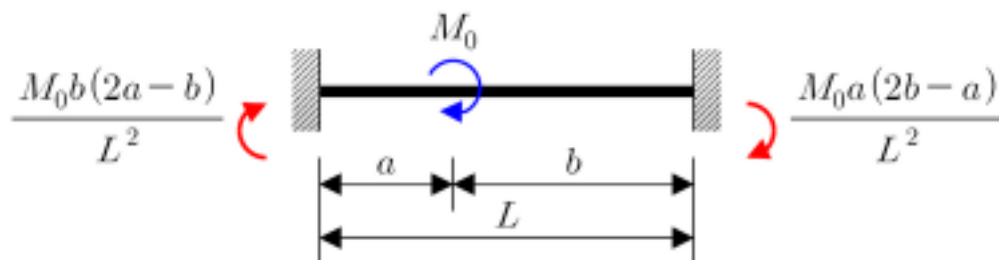Point Load definition:

Moment definition:

$$\frac{M_0 b(2a-b)}{L^2}$$

$$\frac{M_0 a(2b-a)}{L^2}$$

How to use this app

1.Install Python —> https://www.python.org/downloads/
2.Reccomend install Anaconda —> https://docs.anaconda.com/anaconda/install/index.html
3.Install git —> https://github.com/git-guides/install-git

Open terminal (Mac) or Command promp (Windows) or Anaconda promp

4.Create conda env (for first time)
    % conda create --name my_env python=3.10
5.Activate conda env
    % conda activate my_env
6.Go to folder you want and clone or download this repository.(for first time)
    % cd <path to your folder>
    % git clone https://github.com/Suzanoo/beam-analysis.git
7.In stall package (for first time)
`   % pip install -r requirements.txt
8.Run app
    % shiny run —reload app.py

Enjoy !

Example
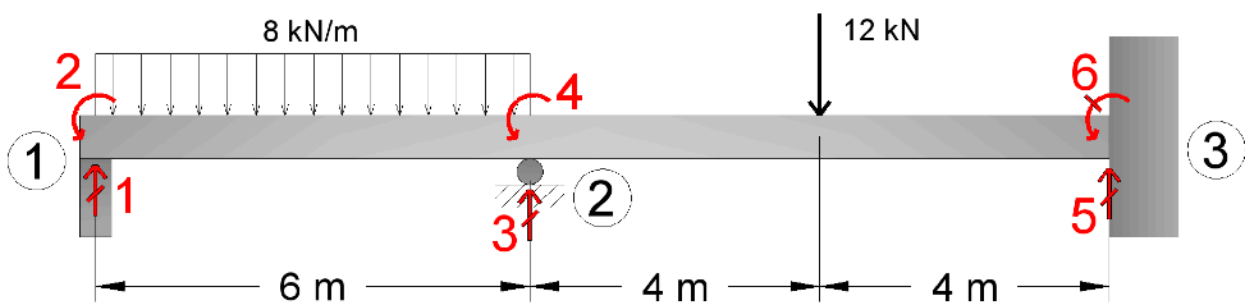
Rectangular RC beam size 20 x 40 cm , I = 0.0011m4, E = 200GPa
note : edited support number 2 to be pin, not be roller as shown in image.

Input

Moment of inertia I = 0.0011

Length of each span
We have 2 stretch , 1st = 6m, 2nd = 8m
Input —> 6, 8 or use space 6 8

Suport type
Suport type labels —> fixed=0, pin=1, free=2 (in this program exclude roller)
Start from left, we input
Input —> 1, 1, 0 or 1 1 0

3.External Load
External Load for each node.We have 3 nodes, and each node we must provide Fy and M

For Fy unit = N with positive for down direction, and negative for up direction.
For M unit = N-m with positive for counter clockwise and negative for clockwise.

In this case all of those is zero.
Input —> 0, 0, 0, 0, 0, 0 or 0 0 0 0 0 0

4.Load in each stretch
We distribute load in 3 type with these labels.
P = point load (unit N)
q = line load (unit N/m2)
M = moment (unit N-m)

Quantity of load
      1st stretch = 1
      2nd stretch = 1

Load type
      1st stretch = q
      2nd stretch = P

Load value definition
      load1 :
            start = 0
            load length = 6
            value = 8000

      load 2:
            position = 4
            value = 12000

Program will render SFD, BMD and you can save it.

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