PSEUDOCODE

Paulina Correa Mejía
Isabel Cristina López Giraldo
Julián López Elejalde

Universidad EAFIT
Finite Element Methods
November 2015

The user enters all the matrices below:

Nodes = [index, x_coordinate, y_coordinate].
Elements = [index, node1_index, node2_index, area, inertia, young_modulus].
Disp_bc = [index, node_index, dof, disp_value].
Forces = [index, node_index, dof, force_value].

Create a function that plots the nodes of the frame.

```
function  Plot Nodes(nodes)

        for node = 1:1: length(nodes)
        plot the nodes
        end
```

Create a function that plots the elements.

```
function Plot Elements (elements, nodes)

        for element = 1:1: length(nodes)
                for node = 1:1: length(elements)
                        Initial node
                        Find the initial node of the given matrices.

                        Final node
                        Find the final node of the given matrices.
                end
        end
```

Create a function that calculates the length and angle of each element.

The length: L= sqrt(Lx(element, i)^2 + Ly(element, i)^2);

The angle: Theta=atan2(Lx(element, i) , Ly(element, i));

Assembly each of them in a matrix.

Create a function that assigns the indexes for each degree of freedom of the frame and the boundary conditions given in the initial matrices.

Create a function that assigns the values for the fixed and the free vectors of the frame.

Create a function that calculates the local K of each element and then assembly it in the global K matrix.

```
for element = 1:1: length(nodes)
        Geometric and material Properties
        Calculate the seven different terms of the local K matrix.
        Calculate the local K matrix for each element.
        Assembly all the local matrices.
end
```

Create a function that calculates the local displacements of each element and then assembly it in the global displacements matrix.

```
for element = 1:1: length(nodes)
        Geometric and material Properties
        Calculate the local U matrix for each element.
        Assembly all the local U matrices. (Global U)
end
```

Create a function that calculates the local forces of each element and then assembly it in the global forces matrix.

```
for element = 1:1: length(nodes)
        Calculate the local F matrix for each element.
        Assembly all the local F matrices. (Global F)
end
```

Create a function that calculates the stresses.

```
for element = 1:1: length(nodes)
        Calculate the local stress, with the appropriate formula.
        Assembly all the local F matrices. (Global F)
end
```