

- In section 3 we covered:
 1. section 3.1: Representation of data and functions pertinent to various FEM objects (*e.g.*, elements, nodes, and dofs).
 2. section 3.2: Steps needed from reading elements and nodes to FEM solution for node and element dof values and forces.
 3. section 3.3: Simplifications that can be employed in Matlab and description of input and output file formats.
- The term project involves:
 - Development of FEM solver for four different element types: 1. bars, 2. beams, 3. trusses, and 4. frames. The process to implement element specific routines (*e.g.*, stiffness and load vectors and well as output function) is described in course notes (section 3.3).
 - Limitations of implementation (*e.g.*, no source term and natural boundary force, same dof for all nodes, and some other are described in 3.3).
 - Input file format is provided in 3.3.
 - Beside solving the FEM problem (all steps in 3.2), the project involves Input/Output operation in accordance with the format given in section 3.3
- Deliverables are:
 1. **All Matlab files** should be submitted in a **zip file** with name “LastNameFEMProject.zip”.
 2. The **output file** corresponding to the truss problem shown in section 3.3. RunName = Truss. Input file is shown in that section and can also be downloaded from: <http://rezaabedi.com/wp-content/uploads/2014/04/Truss.txt>.
 3. From Reference [1]: **Input File** and **output File** for Figure 22.4 (also shown in figure 1(a)). RunName = TrussExt.
 4. From Reference [1]: **Input File** and **output File** for Exercise 22.3 (also shown in figure 1(b)). All geometry and material parameters are provided in the reference. RunName = FrameExt.
 5. From Reference [1]: Exercise 22.4 (A concept question about Exercise 22.3).

References:

[1]. Introduction to Finite Element Methods (ASEN 5007), Fall 2013, Department of Aerospace Engineering Sciences, University of Colorado at Boulder: Part III: Computer Implementation of Finite Elements: Chapter 22 Index. FEM Programs for Trusses and Frames.
Course URL: <http://www.colorado.edu/engineering/cas/courses.d/IFEM.d/>
Chapter 22 URL: <http://www.colorado.edu/engineering/cas/courses.d/IFEM.d/IFEM.Ch22.d/IFEM.Ch22.pdf>

Due Date:

04/24/2014 for Input files needed for deliverables 3 and 4 (problems TrussExt and FrameExt)

05/08/2014 all other items.

(300 Points)

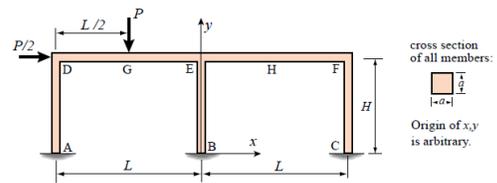
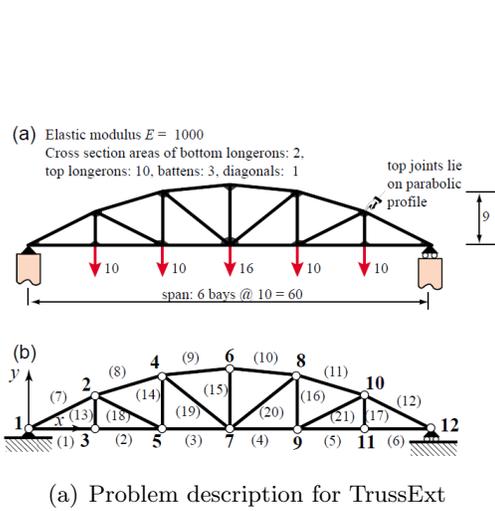


FIGURE E22.3. Plane frame structure for Exercise 22.3.

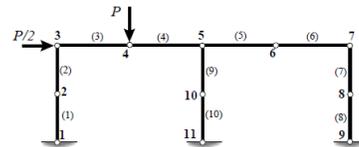


FIGURE E22.4. Recommended FEM discretization for the plane frame of the previous figure.

(b) Problem description for FrameExt

Figure 1: Brief description of two problems from reference [1]; for more information refer to the reference.