Faculty of Maritime Engineering and Marine Sciences

Finite Elements

Assignment N°3b– FEM beam analysis in the plane Nov. 15th, 2020

Teamwork (3 students per group, organized by the students themselves)

You have to use Python programming language and in the code include: names of team members, date, name of course, description of the algorithm, list of input/data and output/results variables, and, references. Also you have to include comments in the source code to identify different steps in the process.

1.- Implement the finite element method to analyze structures composed by beams in the plane. For that, first prepare a flow chart and then proceed with the programming. Data and results must be read and print in text files opened from the program.

2.- Use your computer program to design one of the plane frames of the bridge shown in the following picture. The unsupported span is 10 m, and its height is 5 m. All elements are built from American Standard Steel I beams. The total load is 24 tons, and is to be applied evenly in the horizontal beams of the frame. Use a safety factor of 2.0 with respect to the common steel yield stress; also the elements under compression must be evaluated with respect to the critical buckling load.

To be completed by Saturday November 28th 8 am, when each group will present their project and be evaluated. Source codes must be included in the appendix, and the project with the data files in compressed format also have to be uploaded in the Sidweb to be checked. Report hours employed by each member to complete the project.

Jrml/2020