ME 7120: Finite Element Method Applications

**Project III**

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# Nomenclature

𝟂 = Natural Frequency

Ω =

𝛽 =

D = Displacement

DD = Velocity

DDD = Acceleration

P = Load

L = Length

A = Cross Sectional Area

E = Young’s Modulus of Elasticity

t = Time

F = Force

K = Stiffness Matrix

M = Mass Matrix

C = Damping Matrix

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**Project Description**

For this project III we use Finite Element method to formulate and solve a time dependent structural problem. The objective is to use WFEM to formulate the damping matrix “C” using the stiffness matrix “K” and mass matrix “M” for the “L” shaped structure of fig 11.17-1 from the text book “Concepts and Applications of Finite Element Analysis, 4th Edition, Wiley, 2001”.

The 3D stiffness and mass matrices are reduced to 2D and then the boundary conditions are applied using the find\_C.mat function. This function also generates the C matrix. After which we use the integration method of Newmark beta to calculate for the transient response of the step loading of the system with a force F = N over a total time t = 0.01s, calculating the acceleration (DDD), velocity (DD) and displacement (D) of the system over this time period.

Finally a comparison of the five Newmark beta methods are used to compare the responses generated using WFEM with those gotten from the text book.

**Damping Matrix C**

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