FEM Code Project Report

1. Report the errors and convergence rates measured in L2 and H1 norms (refer to Homework 5)

Change the hh value from 1/10 to 1/100, the results as follows:

L2error will shrink by a factor of 100, while H1error by a factor of 10.

Plot the figure as follows:

2. Determine the value of in Matlab and verify this stability condition by your code.

Solution:

Use “lambda = eigs(inv(M) \* K, 1)” to obtainin the code attached in the Q2 file, which equals 2.2320e+03 in the given conditions(f and g).

Therefore, the upper bound of the time step size is: 2/

The following figures demonstrate the effect of change of dt:

|  |  |  |
| --- | --- | --- |
| dt = 0.01 | dt = | dt = 2  ( < 2/) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

4. Investigate the temperature distribution over the time period (0,T) with T=10 using your code.

Use two meshes and two different time step sizes to make sure your results are mesh-independent. Report your investigation including your numerical settings and the results.