Computational Mechanics Tools: Assignment 2

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1. Changing the maximum edge size with `Mesh > Parameters`, for different values of mesh, the following errors size are obtained:

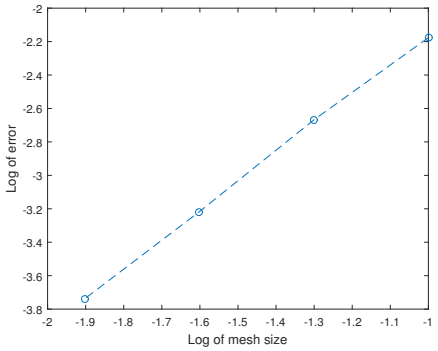

Figure 1: Log-log plot of error vs mesh size.

It is observed that error is bounded with $\|e\|_\infty \approx Ch^{1,7402}$ using the linear regression of Figure 1. Then, the theoretical convergence is held.

2. The error obtained in the simulation depends on the final time, the larger the simulation is the closer the solution is to the analytical one with maximum norm. In Figure 2 is observed this dependence, where at $t_{end} = 1$ the error the maximum error $1,40 \times 10^{-3}$ larger than the maximum error at $t_{end} = 10$ that is $6,05 \times 10^{-4}$, one order of magnitude lower.

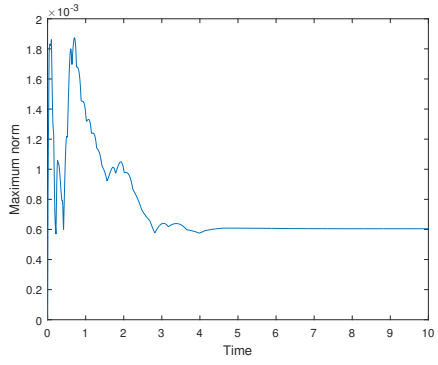

Figure 2: Maximum error vs time.

This dependence is not smooth because of the error expression. The point with maximum error changes with time and the fact of using the absolute value of the error probably provoke this this behavior.

3. As at $t_{end} = 50$ $\exp^{-50} \approx 0$ then the problem is time-independent and, instead, the static problem must be solved because is more efficient. Solving both problems is obtained a maximum error of $0,6047 \times 10^{-3}$.