

CE5310 Numerical Methods

Homework #04

1) Create a program to solve for the roots of the following equation.

$$P_b = 1 - e^{-\left(\frac{DL}{\alpha_{LR}}\right)^{\beta_{LR}}}$$

With

$$\alpha_{LR} = e^{-\left(\frac{b_R}{\beta_{LR}}\right)}$$

Where, P_b denote the probability of breakage of rectangular window glass; DL denotes the uniform lateral pressure, psf; and b_R and β_{LR} denote distribution parameters.

The program should utilize one or more methods to solve for a DL given a probability of breakage. Your solution should prompt the user for the desired probability of breakage and the b_R and β_{LR} distribution parameters. Your program should output each iteration with corresponding values of DL and P_b , and identify which method was used in each iteration. Additionally, your program should prompt the user for a convergence tolerance.

As the P_b distribution is typically based on the results of finite difference stress analysis of a nonlinear rectangular plate, each intermediate step requires a significant amount of time to calculate. Therefore the solution which consistently uses the minimum number of iterations will receive **5 bonus points**

Example Data Set:

β_{LR}	b_R	P_b	DL (psf)
5.218262	-24.4313	0.010333	45
5.218262	-24.4313	0.073778	66

Analysis:

Compare your solution to the built-in MATLAB `fzero()` function. Lists pros/cons of using the `fzero()` function.

Deliverables:

- 1) A pdf including a title page, the problem statement, all m-file listings and example input and output. Preferably bookmarked.
- 2) All m-files, loaded separately, required for your solution to run.

Grading:

Your solution will be graded based on completion of the above requirements, correct performance, neatness and professionalism of pdf submittal.