1. Teaching Learning Based Optimization for Truss Optimization

<https://ww2.mathworks.cn/matlabcentral/fileexchange/51202-teaching-learning-based-optimization-for-truss-optimization>

Teaching Learning Based Optimization method is an evolutionary algorithm that simulates the teaching–learning phenomenon of a classroom. This MATLAB code implements this technique for truss optimization problem. HelpTLBO.mp4 explains how to use the code. More details about TLBO method and more efficient TLBO algorithm could be find in the following references:  
1-Optimal design of truss structures for size and shape with frequency constraints using a collaborative optimization strategy  
2-Multi-class teaching–learning-based optimization for truss design with frequency constraints  
3-Design of space trusses using modified teaching learning based optimization

1. Truss Optimization with MATLAB Genetic Algorithm (GA) Function

<https://ww2.mathworks.cn/matlabcentral/fileexchange/51250-truss-optimization-with-matlab-genetic-algorithm-ga-function>

n the field of artificial intelligence, a genetic algorithm (GA) is a search heuristic that mimics the process of natural selection. This heuristic (also sometimes called a metaheuristic) is routinely used to generate useful solutions to optimization and search problems. Genetic algorithms belong to the larger class of evolutionary algorithms (EA), which generate solutions to optimization problems using techniques inspired by natural evolution, such as inheritance, mutation, selection, and crossover [Reference: Wikipedia].  
This code implements the MATLAB Genetic Algorithm (GA) function for optimization of the benchmark 10-bar truss problem with continuous design variables. More details about this problem and a comparison between results of different optimization methods are available in the following papers:  
1-Multi-class teaching–learning-based optimization for truss design with frequency constraints  
2-Design of space trusses using modified teaching learning based optimization  
HelpGA.mp4 explains how to use the code.

1. Design Optimization of a Helical Compression Spring

<https://ww2.mathworks.cn/matlabcentral/fileexchange/64651-design-optimization-of-a-helical-compression-spring>

These functions are used in both machine design (SE 410) and engineering design optimization (SE 413) courses at UIUC. The function hcs.m takes as input a design vector that represents a helical compression spring design, as well as optional display and variable selection arguments. It computes, based on the textbook Shigley's Mechanical Engineering Design, the design objective function, as well as manufacturing, stress, and other constraint functions. This design optimization implementation is a simplified version of the spring design element of the suspension co-design problem presented in the following ASME journal article:  
<http://mechanicaldesign.asmedigitalcollection.asme.org/article.aspx?articleid=1857514>  
<http://systemdesign.illinois.edu/publications/All14b.pdf>  
The full code for the test problem presented in the journal article is available from:

<http://www.mathworks.com/matlabcentral/fileexchange/40504>

A video demonstrating an older version of this code is available at:

<https://youtu.be/7740qlXuFMk>

