Connor McGarty, cmcgarty - HW2 P2.13 from Chapra Text

File: EE254_cmcgarty_P2_13.m

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Problem P2.13: If a force $F(N)$ is applied to compress a spring, its displacement $x(m)$ can often be modeled by Hooke's law:

$$F = kx$$

where k = the spring constant (N/m). The potential energy stored in the spring $U(J)$ can then be computed as

$$U = \frac{1}{2}kx^2$$

Five springs are tested and the following data compiled: F (N): 14, 18, 8, 9, 13 x (m): 0.013, 0.020, 0.009, 0.010, 0.012

Use MATLAB to store F and x as vectors and then compute vectors of the spring constants and the potential energies. Use the max() function to determine the maximum potential energy.

Solution

```
clear;clc;

force_tested = [14 18 8 9 13]; % N
displacement_tested = [0.0013 0.020 0.009 0.010 0.012]; % m
spring_constants = [];
potential_energies = [];

for index = 1:1:length(force_tested)
    spring_constants(index) = force_tested(index) ./ ...
                              displacement_tested(index);
    potential_energies(index) = 0.5 .* spring_constants(index) .*  ...
                                sqrt(displacement_tested(index));
end

spring_constants
potential_energies
max_potential_energy = max(potential_energies)
```

```
spring_constants =

   1.0e+04 *

  Columns 1 through 3

   1.076923076923077   0.090000000000000   0.088888888888889
```

```
  Columns 4 through 5

   0.090000000000000   0.108333333333333

potential_energies =

   1.0e+02 *

  Columns 1 through 3

   1.941450686788302   0.636396103067893   0.421637021355784

  Columns 4 through 5

   0.450000000000000   0.593366103963930

max_potential_energy =

     1.941450686788302e+02
```

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