Non-linear spring constant problem observation:

Assumption – 350 unit is the force acting on the system at the time of equilibrium of spring system.

* The problem involved a non-linear equation in two variables.
* To solve the problem, we could form equations based on force balance at different node points.
* We understood that in case of nonlinear spring system in series the external net force acting for each system was same.
* At all points inside the spring system, there was no imbalance force.
* For springs in parallel the deflection was same but the external force acting on them was distributed accordingly so as to have same deflection.

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| --- | --- | --- |
| Spring Constant | k at equilibrium | Force acting |
| 500+50u | 522.7765 | 238.141 |
| 200+100u | 245.553 | 111.856 |
|  |  | 305=total |

* Equilibrium Deflection of springs

Spring 1 = 0.45553

Spring 2 = 0.45553

Spring 3 = 0.6225

Potential Energy stored in non-linear springs:

Potential Energy in:

Spring 1 = = 250x2 + 50x3/3 = 53.4523

Spring 2 = = 100x2 + 100x3/3 = 23.9016

Spring 1 = = 250x2 + 100x3/3 = 104.9

Work done by spring = F.(deflection of right end of spring)

= potential energy increased

= 182.254

* As we know that the change in potential energy is equal to the work done by conservation forces and so as to satisfy the equilibrium state of the spring system:

= 182.254

Thus the spring system is acted upon a variable force whose value depends upon the above equation where F varies from 0 to 350.