To: Professor Sargent and TA’s

From: Colin White

Date: May 31, 2018

Subject: Project 1, and bi-stability

Enclosures:

a) fig 1

b) fig 2

c) fig 3

As I ran this code I found that the ration of inner diameter (d) to outer diameter (D) made a great difference in the strain energy curves. It became clear after running my code that the ratio between inner and outer diameter was the made huge differencinc in how the strain energy manifested. In order to determined the stability points, I made my program count how many times the derivative curve fell below zero. I found that when the inner diameter was 5 and 25 (shown in figure 1 and 2) that at least bi-stability was achieved. However, when the inner diameter was 45, bi-stability was not achieved. I also found that the step size of delta (the independent variable) made a huge difference in being able to find the stability points. When the step size of delta was 1\*10^-5, it appeared that only case 1 (figure 1) was bistable. However, when I changed the step size to 1\*10^-6, my program was able to see that case 2 (figure 2) also achieved bi-stability. I was very surprised to see that this small difference made all the difference for the program to be able to find the stability points.

One of the limitations of my program are that it only tells if a case bi-stable. it will not differentiate between having 2 stability points or any number of stability points greater than 2.

To accomplish the objective of the

, and a discussion on bistability (when it is and is not bistable)

It should also include your plots for the strain and the derivative of the strain for the

three cases

Below please find figure 1-3 that display the results I obtained from charting delta versus strain energy three times while changing the inner diameter (d) from 5, to 25, to 45 respectivly.

What

step size should you use as you iterate through

the range of

δ

?

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How can I use the derivative curve to determine bistability?





