Model Equation: Force = B0 + B1\*Pressure

Description: To study how BPA force is related to Pressure, Diameter, Strain, length, and P/DP state, we need to study how B0 and B1 changes with these variables. Check if Force = f(P,D,L,e,S)

**Slope (B1):**

* 10mm BPA :
  + as length increases (all unkink), the slope increases almost linearly.
  + Depressurizing has lower slope compared to Pressurizing (line shifted downwards)
* 20mm BPA:
  + As length increases (all unkink), the slope increases linearly until 40cm length.
  + Depressurizing has lower slope compared to pressurizing (line shifted downwards, same as 10mm)
* 10mm vs 20mm
  + 20mm has steeper increases in slope (D affects slope!)

Conclusion: D and L affects slope.

* + - Increasing D increases slope
    - Increasing L increases slope
    - State affects slope by shifting B1 up or down depending on P or DP. (S)

10mm BPA:

* For the same length: Increasing strain (Eg: kink), decreases slope. Or, shorter Lo decreases slope. (increasing strain decreases slope-nonlinear)
* Depressurizing has lower slope – as stated above.
* Increasing length increases slope.

20mm BPA:

* For the same length, increasing strain decreases slope linearly. (L,e,D,S)
* Increasing length increases slope. (Shift curve upwards).

Conclusion:

* + - Increasing D increases slope (D)
    - Increasing L increases slope (L)
    - State affects slope by shifting B1 up or down depending on P or DP. (S)
    - Increasing strain decreases slope (e)

Question: Do I use strain or (1-relative strain)? Also, since BPA resting length and strain affects the slope, would it be better to use Lo\*(1-relative strain) to get an “Effective length or working length” of the BPA as a parameter?

**Intercept (BO)**

For 10mm BPA :

* + Increasing length increases intercept within all unkink
  + DP has higher intercept for all lengths

For 20mm BPA:

* Pretty random (not much correlation in length and Bo)
* DP has higher intercept compared to P.

Conclusion:

* + - We cannot say that L and D affect intercept.
    - State (S) affects intercept by shifting curve up or down.
* 10mm:
  + For all unkink, increasing length doesn’t show a pattern in B0 > Maybe I should try L\*(relative strain)
  + State: DP has higher B0 compared to P.
  + Increasing strain decreases intercept (B0)
* 20mm
  + For all unkink, increasing length doesn’t show a pattern in B0 > Maybe I should try L\*(relative strain)
  + State: DP has higher B0 compared to P.
  + Increasing strain decreases intercept (B0)
* Comparing 10mm and 20mm:
  + Shape of curve are similar for 10mm and 20mm data; however 20mm data has a smaller range of B0 compared to 10mm data.

Conclusion:

* B0 is affected by the state of Pressurizing or depressurizing (S), diameter (D), and strain(e)
* We might need to plot B0 against L0\*(1-relativestrain) to see if there’s any pattern.

**Trying Lo\*(1-relative strain)**

* Better results compared to Bo vs relative strain
* 10mm:
  + P/DP: pressurizing has lower intercept (shifted downwards)
  + For the same length: Lo\*(1-relative strain) – increasing it increases Bo (increases strain decreases Bo)
  + For all unkink: increasing length decreases Bo. (longer BPA has lower intercept Bo)
* 20mm:
  + Same as 10mm
* Comparing 10mm and 20mm:
  + B0 curve has similar general shape in both 10mm and 20mm; however, 20mm has better separation between different lengths.