Be Foil Analysis

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This notebook is to compute the equivalent thickness of a bent Be foil. We consider two concentric circles, with the largest being of radius "rad" and the smaller of "rad - thick".

```
rad = 36
thick = 0.020
```

```
36
```

```
0.02
```

First angle:

```
theta1@x_D = ArcSin@x • Sqrt@x^2 + rad^2DD
```

$$\mathrm{ArcSinA}\frac{x}{\sqrt{1296 + x^2}}\mathrm{E}$$

Second Angle (smaller circle):

```
theta2@x_D = ArcSin@x • Sqrt@x^2 + Hrad - thickL^2DD
```

$$\mathrm{ArcSinA}\frac{x}{\sqrt{1294.56 + x^2}}\mathrm{E}$$

```
zlow@x_D = rad H1 - Cos@theta1@xDDL
 zupp@x_D = Hrad - thickL H1 - Cos@theta2@xDDL + thick
```

$$36\left(1-\sqrt{1-\frac{x^2}{1296+x^2}}\right)$$

$$0.02+35.98\left(1-\sqrt{1-\frac{x^2}{1294.56+x^2}}\right)$$

Test at zero:

```
zlow@0D
zupp@0D
```

```
0
```

```
0.02
```

The difference is not visible on with only 20 um. Define now the equivalent thickness:

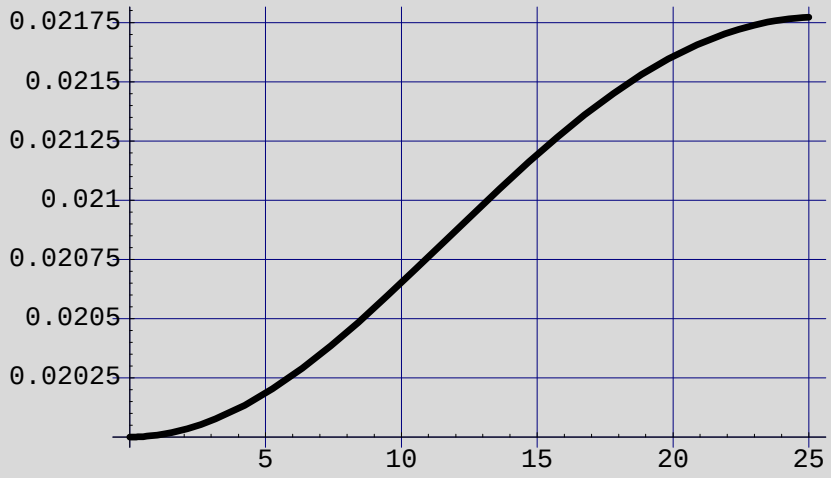
```
tbe@x_D = zupp@xD - zlow@xD
```

$$0.02+35.98\left(1-\sqrt{1-\frac{x^2}{1294.56+x^2}}\right)-36\left(1-\sqrt{1-\frac{x^2}{1296+x^2}}\right)$$

```
tbe@0D
```

```
0.02
```

```
Plot@tbe@xD, 8x, 0, 25<, GridLines -> Automatic,
 PlotStyle -> Thickness@0.01DD
```



- Graphics -

```
Table@Print@"The thickness of Be foil at x= ", x, " is ", tbe@xDD,
 8x, 0, 25, 12.5<D;
```

```
The thickness of Be foil at x= 0 is 0.02
```

```
The thickness of Be foil at x= 12.5 is 0.0209266
```

```
The thickness of Be foil at x= 25. is 0.0217721
```

```
corr = N@27795 • 217721D
```

```
0.127663
```