Symbolic

In[1]:=
```
Clear[dw, lp, β, ds, dj, o]
```

In[2]:=
```
b = {Cos[α], Sin[α]} dw / 2
```

Out[2]= $\left\{\frac{1}{2}\,\text{dw}\,\text{Cos}[\alpha],\ \frac{1}{2}\,\text{dw}\,\text{Sin}[\alpha]\right\}$

In[3]:=
```
αl = α - 90 ° + β
```

Out[3]= $-90\,° + \alpha + \beta$

In[4]:=
```
l = {Cos[αl], Sin[αl]} (lp - ds / 2)
```

Out[4]= $\left\{\left(-\frac{\text{ds}}{2} + \text{lp}\right)\text{Sin}[\alpha + \beta],\ -\left(-\frac{\text{ds}}{2} + \text{lp}\right)\text{Cos}[\alpha + \beta]\right\}$

In[5]:=
```
αe = αl - 90 °
```

Out[5]= $-180\,° + \alpha + \beta$

In[6]:=
```
e = {Cos[αe], Sin[αe]} (dj + ds) / 2
```

Out[6]= $\left\{-\frac{1}{2}(\text{dj} + \text{ds})\,\text{Cos}[\alpha + \beta],\ -\frac{1}{2}(\text{dj} + \text{ds})\,\text{Sin}[\alpha + \beta]\right\}$

In[7]:=
```
s = {o, h}
```

Out[7]= $\{\text{o},\ \text{h}\}$

In[8]:=
```
(b + l + e - s)[[1]]
```

Out[8]= $-\text{o} + \frac{1}{2}\,\text{dw}\,\text{Cos}[\alpha] - \frac{1}{2}(\text{dj} + \text{ds})\,\text{Cos}[\alpha + \beta] + \left(-\frac{\text{ds}}{2} + \text{lp}\right)\text{Sin}[\alpha + \beta]$

In[9]:=
```
Solve[(b + l + e - s)[[2]] == 0, {h}]
```

Out[9]= $\left\{\left\{\text{h} \to \frac{1}{2}(\text{ds}\,\text{Cos}[\alpha + \beta] - 2\,\text{lp}\,\text{Cos}[\alpha + \beta] + \text{dw}\,\text{Sin}[\alpha] - \text{dj}\,\text{Sin}[\alpha + \beta] - \text{ds}\,\text{Sin}[\alpha + \beta])\right\}\right\}$

Example

In[10]:=
```
dw = 250;
lp = 139;
β = 15 °;
ds = 12;
dj = 12;
o = 48;
```

In[16]:=
```
FindRoot[b + l + e - s , {{α, 120 °}, {h, dw}}]
```

Out[16]= $\{\alpha \to 2.05309,\ \text{h} \to 191.995\}$

In[17]:=
```
Plot[(b + l + e - s)[[1]], {α, 0, 180 °}]
```

Out[17]=