Computing A and B from f, p, a and b. We convert ϵ into (a-b)/b.

Take the expression for B

```
In[ ]:= B[b_, f_, eps_, p_, phi0_] = Simplify[(b^2 f (1 + eps) - p - phi0 b (2 + eps)) / eps]
```

$$\text{Out[ ]=} -\frac{-b^2 (1+eps) f + p + b (2+eps) phi0}{eps}$$

Substitute ϵ = (a - b)/b

```
In[ ]:= Bp[b_, f_, a_, p_, phi0_] = Simplify[B[b, f, (a - b) / b, p, phi0]]
```

$$\text{Out[ ]=} \frac{b (a b f - p - a\, phi0 - b\, phi0)}{a - b}$$

$$\text{In[ ]:=} \text{Simplify}\left[Bp[b, f, a, p, phi0] == \frac{b (a b f - p - phi0 (a + b))}{a - b}\right]$$

Out[ ]= True

Take the particle wrt a

$$\text{In[ ]:=} \text{Simplify}\left[D[Bp[b, f, a, p, phi0], a] == \frac{b \left(p + 2 b\, phi0 - b^2 f\right)}{(a - b)^2}\right]$$

Out[ ]= True

Take the particle wrt b

$$\text{In[ ]:=} \text{Simplify}\left[D[Bp[b, f, a, p, phi0], b] == \frac{a^2 (2 b f - phi0) + b^2 phi0 - a (b (b f + 2\, phi0) + p)}{(a - b)^2}\right]$$

Out[ ]= True

$$\text{In[ ]:=} \text{Simplify}\left[D[Bp[b, f, a, p, phi0], phi0] == -\frac{b (a + b)}{a - b}\right]$$

Out[ ]= True

$$\text{In[ ]:=} \text{Simplify}\left[D[Bp[b, f, a, p, phi0], f] == \frac{a b^2}{a - b}\right]$$

Out[ ]= True

$$\text{In[ ]:=} \text{Simplify}\left[D[Bp[b, f, a, p, phi0], p] == -\frac{b}{a - b}\right]$$

Out[ ]= True

```
In[ ]:= A[B_, b_, phi0_, f_, eps_] = (B / b + phi0 - b f) (1 + eps) / eps
```

$$\text{Out[ ]=} \frac{(1 + eps) \left(\frac{B}{b} - b f + phi0\right)}{eps}$$

In[ ]:=
```
Ap[b_, phi0_, f_, a_, p_] = Simplify[A[Bp[b, f, a, p, phi0], b, phi0, f, (a - b) / b]]
```

Out[ ]= $\frac{a\left(b^2 f - p - 2 b\, \text{phi0}\right)}{(a-b)^2}$

In[ ]:= $\text{Simplify}\left[\text{Ap}[b, \text{phi0}, f, a, p] == \frac{a\left(b^2 f - p - 2 b\, \text{phi0}\right)}{(a-b)^2}\right]$

Out[ ]= True

In[ ]:= $\text{Simplify}\left[D[\text{Ap}[b, \text{phi0}, f, a, p], b] == \frac{2 a\,(a b f - p - \text{phi0}\,(a+b))}{(a-b)^3}\right]$

Out[ ]= True

In[ ]:= $\text{Simplify}\left[D[\text{Ap}[b, \text{phi0}, f, a, p], a] == \frac{(a+b)\left(-b^2 f + p + 2 b\, \text{phi0}\right)}{(a-b)^3}\right]$

Out[ ]= True

In[ ]:= $\text{Simplify}\left[D[\text{Ap}[b, \text{phi0}, f, a, p], \text{phi0}] == -\frac{2 a b}{(a-b)^2}\right]$

Out[ ]= True

In[ ]:= $\text{Simplify}\left[D[\text{Ap}[b, \text{phi0}, f, a, p], f] == \frac{a b^2}{(a-b)^2}\right]$

Out[ ]= True

In[ ]:= $\text{Simplify}\left[D[\text{Ap}[b, \text{phi0}, f, a, p], p] == -\frac{a}{(a-b)^2}\right]$

Out[ ]= True