

Calculating G from F

Have $F(T, V)$, need to get $G(T, P)$

$$G = F + PV$$

$$P = -\left(\frac{\partial F}{\partial V}\right)\bigg|_T$$

$F(V)|_T$ is a parabola, so fit the values obtained to get $F(V)|_T = a(V-b)^2 + C$

a, b, c are functions of T

$$\text{using this we get } \left(\frac{\partial F}{\partial V}\right)\bigg|_T = 2a(V-b)$$

$$\Rightarrow P = 2a(b-V)$$

invert to get

$$V(P) = b - \frac{P}{2a}$$

Now have

$$\begin{aligned} G(T, P) &= F(T, V(P)) + PV(P) \\ &= F(T, V(P)) + Pb - \frac{P^2}{2a} \end{aligned}$$

Change the coordinates of $F(T, P(V))$

from V to P

For each point of P that we have F for,
calculate

$$G(T, P) = F(T, P) + Pb - \frac{P^2}{2a}$$

↑

With this function, can then do bicubic interpolation
(`scipy.interpolate.interp2d`)