In[]:=
$$(*A=\frac{\sqrt{\left((2\lambda_D*\sigma)^2+(\omega*\epsilon*Pi)^2+x_{min}*x_{max}\right)^2+(2\lambda_D*\sigma*\omega*\epsilon*Pi\,(x_{max}-x_{min}))^2}}{(2\lambda_D*\sigma)^2+(\omega*\epsilon*Pi*x_{min})^2};*)$$

$$A=\frac{\left(2\,\lambda_D*\sigma\right)^2+\left(\omega*\epsilon*Pi*x_{max}\right)^2}{\left(2\,\lambda_D*\sigma\right)^2+\left(\omega*\epsilon*Pi*x_{min}\right)^2};$$

$$\theta=\text{ArcTan}\left[\frac{2\,\lambda_D*\sigma*\omega*\epsilon*Pi\,(x_{max}-x_{min})}{\left(2\,\lambda_D*\sigma\right)^2+\left(\omega*\epsilon*Pi\right)^2 x_{min}*x_{max}}\right];$$

反正切

$$Zo=\frac{Pi\left(\sqrt{k}+\frac{1}{\sqrt{k}}\right)}{2\,l*\sigma}*\frac{\sqrt{Log[A]}-I*\theta}{Log[A]+\theta^2}$$

Out[]=
$$\frac{\left(\frac{1}{\sqrt{k}}+\sqrt{k}\right)\pi\left(-i\,\text{ArcTan}\left[\frac{2\pi\epsilon\sigma\omega\,(x_{max}-x_{min})\,\lambda_D}{\pi^2\epsilon^2\omega^2 x_{max}x_{min}+4\sigma^2\lambda_D^2}\right]+\sqrt{\text{Log}\left[\frac{\pi^2\epsilon^2\omega^2 x_{max}^2+4\sigma^2\lambda_D^2}{\pi^2\epsilon^2\omega^2 x_{min}^2+4\sigma^2\lambda_D^2}\right]}\right)}{2\,l\,\sigma\left(\text{ArcTan}\left[\frac{2\pi\epsilon\sigma\omega\,(x_{max}-x_{min})\,\lambda_D}{\pi^2\epsilon^2\omega^2 x_{max}x_{min}+4\sigma^2\lambda_D^2}\right]^2+\text{Log}\left[\frac{\pi^2\epsilon^2\omega^2 x_{max}^2+4\sigma^2\lambda_D^2}{\pi^2\epsilon^2\omega^2 x_{min}^2+4\sigma^2\lambda_D^2}\right]\right)}$$

In[]:=
$$Z=\frac{1}{\int_{x_{min}}^{x_{max}}\frac{2\sqrt{k}\,\epsilon\sigma\omega}{(1+k)\,(\pi x\epsilon\omega-2\,i\,\sigma\lambda_D)}\,dx}$$

Out[]=
$$\left(\left(1+k\right)\pi\right)\Big/\left(\sqrt{k}\,\sigma\left(2\,i\,\text{ArcTan}\left[\frac{\pi\epsilon\omega\,x_{max}}{2\,\sigma\lambda_D}\right]-2\,i\,\text{ArcTan}\left[\frac{\pi\epsilon\omega\,x_{min}}{2\,\sigma\lambda_D}\right]+\text{Log}\left[\pi^2\epsilon^2\omega^2 x_{max}^2+4\sigma^2\lambda_D^2\right]-\text{Log}\left[\pi^2\epsilon^2\omega^2 x_{min}^2+4\sigma^2\lambda_D^2\right]\right)\right)\quad\text{if}\quad condition$$