$$p\left(\frac{d^2\phi_p}{dy^2}-k^2\phi_p\right)-\left(\frac{d^2\phi_i}{dy^2}-k^2\phi_i\right)+ikU\left(\frac{d^2\phi_p}{dy^2}-k^2\phi_p\right)+ik\frac{dQ}{dy}\phi_p=0$$