Upon solving the integral  $\int_0^{\Delta s_j} (as_j + b) \frac{As_j + B}{s_j^2 + Cs_j + D} ds_j$  in Python, the following solution was obtained:

$$-(\gamma_{j+1}-\gamma_j)\cos(\theta i-\theta j)-\left(\frac{((-xi+\hat{x}i)\cos(\theta j)+(-yj+\hat{y}i)\sin(\theta j))(\gamma j+1-\gamma j)}{2\Delta sj}+\frac{(\gamma j+1-\gamma j)(2\sin(\theta j))(\gamma j+1-\gamma j)}{2\Delta sj}+\frac{(\gamma j+1-\gamma j)(2\cos(\theta j))(2\Delta j+1-\gamma j)}{2\Delta sj}+\frac{(\gamma j+1-\gamma j)(2\cos(\theta j))(2\Delta j+1-\gamma j)}{2\Delta sj}+\frac{(\gamma j+1-\gamma j)(2\Delta j+1-\gamma j$$

$$\left(\frac{\left(\left(-xi+\hat{x}i\right)\cos\left(\theta j\right)+\left(-yj+\hat{y}i\right)\sin\left(\theta j\right)\right)\left(\gamma j+1-\gamma j\right)}{2\Delta sj}+\frac{\left(\gamma j+1-\gamma j\right)\left(2\sin\left(\theta j\right)yj-2\sin\left(\theta j\right)\hat{y}i+2\cos\left(\theta j\right)\hat{y}i+2\sin\left(\theta j\right)\hat{y}i+2\cos\left(\theta j\right)\hat{y}i+2\sin\left(\theta j$$

$$\left(\frac{\left(\left(-xi+\hat{x}i\right)\cos\left(\theta j\right)+\left(-yj+\hat{y}i\right)\sin\left(\theta j\right)\right)\left(\gamma j+1-\gamma j\right)}{2\Delta sj}+\frac{\left(\gamma j+1-\gamma j\right)\left(2\sin\left(\theta j\right)yj-2\sin\left(\theta j\right)\hat{y}i+2\cos\left(\theta j\right)\hat{y}i+2\sin\left(\theta j\right)\hat{y}i+2\sin\left($$

$$\left(\frac{\left(\left(-xi+\hat{x}i\right)\cos\left(\theta j\right)+\left(-yj+\hat{y}i\right)\sin\left(\theta j\right)\right)\left(\gamma j+1-\gamma j\right)}{2\Delta sj}+\frac{\left(\gamma j+1-\gamma j\right)\left(2\sin\left(\theta j\right)yj-2\sin\left(\theta j\right)\hat{y}i+2\cos\left(\theta j\right)\hat{y}i+2\sin\left(\theta j\right)\hat{y}i+2\cos\left(\theta j\right)\hat{y}i+2\sin\left(\theta j$$