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

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

$$\log(\frac{-\frac{2((-xi+\hat{x}i)\cos(\theta j)+(-yj+\hat{y}i)\sin(\theta j))((-xi+\hat{x}i)^2+(-yj+\hat{y}i)^2)(\gamma j+1-\gamma j)}{\Delta sj}+((-xi+\hat{x}i)\cos(\theta j)+(-yj+\hat{y}i)\sin(\theta j))(2\sin(\theta j)yj-2\sin(\theta j)\hat{y}}{}$$
$$(\frac{((-xi+\hat{x}i)\cos(\theta j)+(-yj+\hat{y}i)\sin(\theta j))(\gamma j+1-\gamma j)}{2\Delta sj}+\frac{(\gamma j+1-\gamma j)(2\sin(\theta j)yj-2\sin(\theta j)\hat{y}i+2\cos(\theta j)xi-2\cos(\theta j)\hat{x}i)\cos(\theta i-\theta j)}{2\Delta sj}-$$
$$\frac{\cos(\theta i-\theta j)\gamma j}{2}-\frac{-\frac{((-xi+\hat{x}i)\cos(\theta j)+(-yj+\hat{y}i)\sin(\theta j))(\gamma j+1-\gamma j)(2\sin(\theta j)yj-2\sin(\theta j)\hat{y}i+2\cos(\theta j)xi-2\cos(\theta j)\hat{x}i)}{\Delta sj}+2((-xi+\hat{x}i)\cos(\theta j)+(-yj+\hat{y}}{2\sqrt{-4}}$$

$$\log(\Delta sj+\frac{-\frac{2((-xi+\hat{x}i)\cos(\theta j)+(-yj+\hat{y}i)\sin(\theta j))((-xi+\hat{x}i)^2+(-yj+\hat{y}i)^2)(\gamma j+1-\gamma j)}{\Delta sj}+((-xi+\hat{x}i)\cos(\theta j)+(-yj+\hat{y}i)\sin(\theta j))(2\sin(\theta j)yj-2}{}$$
$$(\frac{((-xi+\hat{x}i)\cos(\theta j)+(-yj+\hat{y}i)\sin(\theta j))(\gamma j+1-\gamma j)}{2\Delta sj}+\frac{(\gamma j+1-\gamma j)(2\sin(\theta j)yj-2\sin(\theta j)\hat{y}i+2\cos(\theta j)xi-2\cos(\theta j)\hat{x}i)\cos(\theta i-\theta j)}{2\Delta sj}-$$
$$\frac{\cos(\theta i-\theta j)\gamma j}{2}+\frac{-\frac{((-xi+\hat{x}i)\cos(\theta j)+(-yj+\hat{y}i)\sin(\theta j))(\gamma j+1-\gamma j)(2\sin(\theta j)yj-2\sin(\theta j)\hat{y}i+2\cos(\theta j)xi-2\cos(\theta j)\hat{x}i)}{\Delta sj}+2((-xi+\hat{x}i)\cos(\theta j)+(-yj+\hat{y}}{2\sqrt{-4}}$$

$$\log(\frac{-\frac{2((-xi+\hat{x}i)\cos(\theta j)+(-yj+\hat{y}i)\sin(\theta j))((-xi+\hat{x}i)^2+(-yj+\hat{y}i)^2)(\gamma j+1-\gamma j)}{\Delta sj}+((-xi+\hat{x}i)\cos(\theta j)+(-yj+\hat{y}i)\sin(\theta j))(2\sin(\theta j)yj-2\sin(\theta j)\hat{y}}{}$$
$$(\frac{((-xi+\hat{x}i)\cos(\theta j)+(-yj+\hat{y}i)\sin(\theta j))(\gamma j+1-\gamma j)}{2\Delta sj}+\frac{(\gamma j+1-\gamma j)(2\sin(\theta j)yj-2\sin(\theta j)\hat{y}i+2\cos(\theta j)xi-2\cos(\theta j)\hat{x}i)\cos(\theta i-\theta j)}{2\Delta sj}-$$
$$\frac{\cos(\theta i-\theta j)\gamma j}{2}+\frac{-\frac{((-xi+\hat{x}i)\cos(\theta j)+(-yj+\hat{y}i)\sin(\theta j))(\gamma j+1-\gamma j)(2\sin(\theta j)yj-2\sin(\theta j)\hat{y}i+2\cos(\theta j)xi-2\cos(\theta j)\hat{x}i)}{\Delta sj}+2((-xi+\hat{x}i)\cos(\theta j)+(-yj+\hat{y}}{2\sqrt{-4}}$$