$$\cos\theta\frac{\partial}{\partial\tau}\int_{-\infty}^{\xi}\sin\theta\,\mathrm{d}\xi-\sin\theta\frac{\partial}{\partial\tau}\int_{-\infty}^{\xi}\cos\theta\,\mathrm{d}\xi=-\mu\frac{\partial^2\theta}{\partial\xi^2}.$$

In the above integral I want to eliminate the integral by differentiating the equation once with respect to \xi once.

$$\frac{\partial}{\partial\xi}(\cos\theta)\frac{\partial}{\partial\tau}\int_{-\infty}^{\xi}\sin\theta d\xi+\cos\theta\frac{\partial^2}{\partial\xi\partial\tau}\int_{-\infty}^{\xi}\sin\theta d\xi-\frac{\partial}{\partial\xi}(\sin\theta)\frac{\partial}{\partial\tau}\int_{-\infty}^{\xi}\cos\theta d\xi$$

$$-\sin\theta\frac{\partial^2}{\partial\xi\partial\tau}\int_{-\infty}^{\xi}\cos\theta d\xi=-\mu\frac{\partial^3\theta}{\partial\xi^3}$$

This problem I took from a journal which has the final form

$$\frac{\partial}{\partial\xi}\{F(\theta)/(\partial\theta/\partial\xi)\}=-\mu\frac{\partial^2\theta}{\partial\xi^2}\frac{\partial\theta}{\partial\xi},$$

Where

$$F(\theta)=\frac{\partial\theta}{\partial\tau}+\mu\frac{\partial^3\theta}{\partial\xi^3}.$$