$$A^0(U;t)\partial_t U + \sum_{k=1}^{3} A^k(U;t)\partial_k U + B(U;t)U = G(U;t) \tag{0.1}$$

$$\Delta\Phi = 4\pi R^2 \sigma, \tag{0.2}$$

$$\begin{cases} A^0(U;t)\partial_t U + \sum_{a=1}^{3} A^a(U;t)\partial_a U = \widehat{G}(U;t), \\ U(0,x) = u_0(x), \end{cases} \tag{QSA0}$$

The main idea of the proof is to show convergence in the $H^{m-1}(\mathbb{T}^3)$ norm for the derivatives of the solution. So we start by differentiating equation (QSA0) with respect to the spatial variables D_x and obtain