Sharp well-posedness for a coupled system of mKdV type equations

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Abstract:

We consider the initial value problem (IVP) associated to a system consisting modified Korteweg-de Vries (mKdV) type equations and prove the local well-posedness results for given data in low regularity Sobolev spaces $H^s(\mathbb{R}) \times H^s(\mathbb{R})$, $s > -\frac{1}{2}$. We also prove that the local well-posedness result is sharp in two different ways, viz., for $s < -\frac{1}{2}$ the key trilinear estimates used in the proof of the local well-posedness theorem fail to hold, and the flow-map that takes initial data to the solution fails to be C^3 at the origin.