Classical Solutions of the Generalized Camassa-Holm equation

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ABSTRACT

In this presentation, well-posedness in \( C^1(\mathbb{R}) \) (a.k.a. classical solutions) for a generalized Camassa-Holm equation (g-kbCH)

\[
\begin{aligned}
(1 - \partial^2_x) \partial_t u &= u^k \partial_x^3 u + bu^{k-1} \partial_x u \partial_x^2 u - (b + 1)u^k \partial_x u, \\
u(x, 0) &= u_0(x), \quad x \in \mathbb{R} \text{ and } t \in \mathbb{R},
\end{aligned}
\] (0.1)

having \((k + 1)\)-degree nonlinearities is shown. This result holds for the Camassa-Holm, the Degasperi-Procesi and the Novikov equations, which improves upon earlier results in Sobolev and Besov spaces.