

Unbounded Solutions of the Modified Korteweg-De Vries Equation

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Consider the initial value problem for the focusing mKdV equation $u_t + u^2u_x + u_{xxx} = 0$ where the initial data u_0 is a smooth unbounded function having asymptotic expansion at infinity in decreasing powers of x . One may construct an asymptotic solution with polynomial coefficients if $\frac{d^n}{dx^n}u_0 = o(|x|^{\frac{1}{2}-n})$ for each $n \in \mathbb{N}$. We show that an asymptotic solution differs from a genuine solution by a smooth function that is of Schwartz class with respect to x and that solves a generalized version of the focusing mKdV equation. The latter equation is solved by discretization methods.