

Unbounded Solutions of the Modified Korteweg-De Vries Equation

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We prove local existence and uniqueness of solutions of the focusing modified Korteweg - de Vries equation $u_t + u^2 u_x + u_{xxx} = 0$ in classes of unbounded functions that admit an asymptotic expansion at infinity in decreasing powers of x . 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.