On the orbital stability of Gaussian solitary waves in the log-KdV equation

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Abstract.

We consider the logarithmic Korteweg-de Vries (log-KdV) equation, which models solitary waves in anharmonic chains with Hertzian interaction forces. By using an approximating sequence of global solutions of the regularized generalized KdV equation in $H^1(R)$ with conserved L^2 norm and energy, we construct a weak global solution of the log-KdV equation in a subset of $H^1(R)$. This construction yields conditional orbital stability of Gaussian solitary waves of the log-KdV equation, provided uniqueness and continuous dependence of the constructed solution holds.

Furthermore, we study the linearized log--KdV equation at the Gaussian solitary wave and prove that the associated linearized operator has a purely discrete spectrum consisting of simple purely imaginary eigenvalues in addition to the double zero eigenvalue. The eigenfunctions, however, do not decay like Gaussian functions but have algebraic decay.

This is a joint work with R. Carles (University of Montpellier)