In this work we consider the Kawahara equation

$$u_t + u_{xxx} + uu_{xxxx} + uu_x = 0.$$  

This equation is related to one-dimensional evolution of small amplitude long waves in several problems arising in fluid dynamics. We establish a unique continuation property for the Kawahara equation. We say that an operator $L$ has the unique continuation property if every solution $u$ of $Lu = 0$ which vanishes on some non-empty open set $O$ of $\mathcal{Q}$ vanishes in the horizontal component of $O$ in $\mathcal{Q}$, that is, in $\{ (x,t) \in \mathcal{Q}, \exists x_1, (x_1,t) \in O \}$. To state such property, we use a Carleman inequality for a linear differential operator related to the Kawahara equation.

References


