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# On the critical KdV equation with time-oscillating nonlinearity

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We investigate the initial value problem (IVP) associated to the equation

$$u_t + \partial_x^3 u + g(\omega t)\partial_x(u^5) = 0,$$

where $g$ is a periodic function. Using techniques developed in [1], we prove that, for given initial data $\phi \in H^1(R)$, as $|\omega| \to \infty$, the solution $u_\omega$ converges to the solution $U$ of the initial value problem associated to

$$U_t + \partial_x^3 U + m(g)\partial_x(U^5) = 0,$$

with the same initial data, where $m(g)$ is the average of the periodic function $g$. Moreover, if the solution $U$ is global and satisfies $\|U\|_{L_x^5 L_t^{10}} < \infty$, then we prove that the solution $u_\omega$ is also global provided $|\omega|$ is sufficiently large.

## References

[1] T. CAZENAVE AND M. SCIALOM, *A Schrödinger equation with time-oscillating nonlinearity*, *Revista Matemática Complutense*, **23, 2**, 321-338, 2010.

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