The Cauchy problem for the Benjamin-Ono equation in $L^2$ revisited

Didier Pilod
Federal University of Rio de Janeiro/ University of Chicago
Joint work with Luc Molinet

Abstract: The Benjamin-Ono equation models the unidirectional evolution of weakly nonlinear dispersive internal long waves at the interface of a two-layer system, one being infinitely deep.

The Cauchy problem associated to this equation presents interesting mathematical difficulties and has been extensively studied in the recent years. In a recent work [1], Ionescu and Kenig proved well-posedness for real-valued initial data in $L^2(\mathbb{R})$.

In this talk, we will give another proof of Ionescu and Kenig’s result, which moreover provides stronger uniqueness results. In particular, we prove unconditional well-posedness in $H^s(\mathbb{R})$, for $s > \frac{1}{4}$. Note that our approach also permits to simplify the proof of the global well-posedness in $L^2(\mathbb{T})$ in [2] and yields unconditional well-posedness in $H^{3/4}(\mathbb{T})$.

References

[1] A. Ionescu and C. E. Kenig. Global well-posedness of the Benjamin-Ono equation in low-regularity spaces. J. Amer. Math. Soc. 20, 753–798, 2007.

[2] L. Molinet. Global well-posedness in $L^2$ for the periodic Benjamin-Ono equation. Amer. J. Math. 130, 635–683, 2008.

[3] L. Molinet and D. Pilod. The Cauchy problem for the Benjamin-Ono in $L^2$ revisited. To appear in Anal. PDE, 2012.