

ON THE WELL-POSEDNESS FOR A HIGHER-ORDER NONLINEAR SCHRÖDINGER EQUATION WITH VARIABLE COEFFICIENTS IN MODULATION SPACES

ABSTRACT. In this work, we consider the initial value problem (IVP) associated with a higher-order nonlinear Schrödinger (h-NLS) equation with variable coefficients:

$$\begin{cases} \partial_t u + ia(t)\partial_x^2 u + b(t)\partial_x^3 u = 2ia(t)|u|^2 u + 6b(t)|u|^2 \partial_x u, \\ u(x, 0) = u_0(x). \end{cases}$$

The main objective is to investigate the well-posedness of the IVP when the initial data belong to the modulation space $M_s^{2,p}(\mathbb{R})$. We prove that the IVP is globally well-posed for initial data in $M_s^{2,p}(\mathbb{R})$ whenever $s \geq 1/4$ and $p \geq 2$.

Authors.

- (1) XAVIER CARVAJAL. *Universidade Federal do Rio de Janeiro.*

E-mail: carvajal@im.ufrj.br

- (2) FIDEL CUBA. *Universidad ESAN.*

E-mail: fcuba@esan.edu.pe

References.

- (1) R. Killip, M. Visan and X. Zhang, *Low regularity conservation laws for integrable PDE*, , Geom. Funct. Anal, **28**, 2018, 1062-1090.
- (2) P. Mamyshev, *Generation and compression of femtosecond solitons in optical fibers*, *Optical Solitons-Theory and Experiment*, J.R. Taylor, ed., Cambridge Studies in Modern Optics, **10**, 1992, 266–313.
- (3) T. Oh, Y. Wang, *Global well-posedness of the one-dimensional cubic nonlinear Schrödinger equation in almost critical spaces*, J. Differential Equations, **269**, 2020, 612-640.
- (4) Y. Wang, T. Oh, *On global well-posedness of the modified KdV equation in modulation spaces*, Discrete and Continuous Dynamical Systems, **41** (2021) 3409–3437.