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Title: Modulation Spaces and Applications to NLS and NLW

Abstract: We discuss some progress in the last decade (and ongoing interest) of modulation spaces from the PDE point of view. We prove the recent results on composition operators, Hermite multiplier, and Hartree type equations (HTE) on modulation spaces.

As an application to these we show:
- the standard method for the evolution of NLS cannot be considered for nonlinearity of the form $u|u|^{\alpha}, \alpha \in (0, \infty) \setminus 2\mathbb{N}$ in modulation spaces.
- the solutions to the free wave and Schrödinger equations associated to Hermite operator $H = -\Delta + |x|^2$ with initial data in a modulation space will remain in the same modulation space for all times.
- the global wellposedness results for the HTE are obtained in modulation spaces.