On stability of solitary waves in the nonlinear Dirac equation

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Abstract. The main result is that the solitary waves in the nonlinear Dirac equation (the Soler model) are linearly stable: the linearization at a solitary wave has purely imaginary spectrum. The result holds for small amplitude ("weakly relativistic") solitary waves, for charge-subcritical and charge-critical nonlinearities. In particular, the result holds for quintic nonlinear Dirac equation on the line and for cubic nonlinear Dirac equation on the plane.

We show that this result is related to the existence of bi-frequency solitary waves: their presence excludes bifurcation of point eigenvalues from embedded threshold points.

This is a joint work with Nabile Boussaid, Laboratoire de Mathématiques de Besançon.