

On global attractors of nonlinear hyperbolic PDEs

ALEXANDER KOMECH

IITP, Moscow, Russia and Vienna University

akomech@iitp.ru

We consider Klein-Gordon and Dirac equations coupled to $U(1)$ -invariant nonlinear oscillators. Solitary waves of the coupled nonlinear system form two-dimensional submanifold in the Hilbert phase space of finite energy solutions.

Main Theorem. Let all the oscillators be strictly nonlinear. Then any finite energy solution converges, in the long time limit, to the solitary manifold in the local energy seminorms.

The investigation is inspired by Bohr's postulates on transitions to quantum stationary states. The results are obtained for:

- 1D KGE coupled to one oscillator [1,2,3], and to finitely many oscillators [4];
- n D KGE and Dirac coupled to one oscillator via mean field interaction [5, 6].

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