Kapitanski, Lev
Global and unique weak solutions of nonlinear wave equations. (English) Zbl 0841.35067
Math. Res. Lett. 1, No. 2, 211-223 (1994).

The existence and uniqueness of global weak solutions of the problem $\mathcal{L}u+f(u)=0$, $u(0)=u_0$, $u_t(0)=u_1$ is studied, where $\mathcal{L}$ is a linear wave operator and the nonlinearity f has the so-called critical growth at infinity, typically,

$$f(u)=|u|^\sigma u,\quad \sigma=\frac{4}{N-2},$$

where N is the spatial dimension. The main result of the paper states that all weak solutions (u,u_t) of the problem are continuous in time with values in the energy space $H^1(\mathbb{R}^N)\times L^2(\mathbb{R}^N)$. In particular, the energy is a continuous function of time.

Reviewer: E.Feireisl (Praha)

MSC:

35L70 Second-order nonlinear hyperbolic equations
35L15 Initial value problems for second-order hyperbolic equations
35B65 Smoothness and regularity of solutions to PDEs

Keywords:

nonlinear wave equations; critical growth at infinity

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