Recent progress for wave models with scale invariant mass and dissipation

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We discuss the Cauchy problem for semi-linear wave models with scale invariant mass and dissipation and with a power non-linearity

$$u_{tt} - \Delta u + \frac{\mu_1}{1+t} u_t + \frac{\mu_2^2}{(1+t)^2} u = |u|^p, \ \ u(0,x) = u_0(x), \ \ u_t(0,x) = u_1(x)$$

where μ_1, μ_2^2 are non-negative constants. On the one hand we explain some results for the corresponding linear model with vanishing right-hand side. On the other hand we are interested in global (in time) existence results for the semi-linear models. Here our main issue is to determine the critical exponent dividing the range of admissible exponents into those producing, in general, a blow-up behavior of solutions and those allow the proof of global existence (in time) of small data solutions. The interplay between μ_1 and μ_2 plays an important role in the study of the linear problem and consequently in the semi-linear problem, determining the different tools that results suitable in each case. Some discussion of optimality of our results and some open problems complete the talk.