Recent progress for wave models with time-dependent mass and dissipation

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Abstract We discuss the Cauchy problem for semi-linear wave models with time-dependent mass and dissipation

$$u_{tt} - \Delta u + b(t)u_t + m(t)^2 u = |u|^p, \;\; u(0,x) = u_0(x), \;\; u_t(0,x) = u_1(x)$$

and with a power non-linearity. On the one hand we explain several new 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. Matsumura type estimates for solutions to parameter-dependent Cauchy problems are an important tool in our approach. Some discussion of optimality of our results and some open problems complete the talk.