



FMSP Lectures

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Energy methods and blow-up rate for semilinear
wave equations in the superconformal case

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Abstract:

In a series of papers with Mohamed Ali Hamza (University of Tunis-el Manar), we consider the semilinear wave equations with power nonlinearity.

In the subconformal and the conformal case, we consider perturbations with lower order terms and modify the Lyapunov functional Antonini and Merle designed for the unperturbed case. We also find a blow-up criterion for the equation. As a consequence, we bound the Lyapunov functional. Thanks to interpolations in Sobolev spaces and a Gagliardo-Nirenberg inequality, we bound the solution in the self-similar variable, which gives a sharp bound on the blow-up rate.

Surprisingly, our approach works in the superconformal case (still Sobolev subcritical), leading to a new bound on the blow-up rate, which improves the bound of Killip, Stoval and Visan.