

# On blow-up curves for semilinear wave equations

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## Abstract

In a joint work with H. Zaag, we consider the semilinear wave equation with focusing power nonlinearity in one space dimension. Blow-up solutions are known to exist, and the solution can be defined on some domain of definition under the blow-up curve  $\{t = T(x)\}$ .

Considering an arbitrary blow-up solution, our goal is to describe its behavior near the blow-up curve, and the geometry of the blow-up curve itself. Such properties are linked to the notion of non-characteristic points on the curve.

First, we find criteria on initial data to ensure the existence or the non-existence of characteristic points. Then, we prove the regularity of the blow-up curve away from characteristic points, and show a surprising isolatedness property for characteristic points, together with the classification of the behavior of the solution near them.

In order to do this, we introduce for this problem a notion of critical space. Furthermore, we link the geometrical properties of the blow-up curve with the problem of decomposing a general solution into a sum of solitons.

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