

Singularities for semilinear heat equation with spatially dependent potential

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We consider nonnegative solutions for a semilinear heat equation with spatially dependent nonnegative potential. The domain under consideration may be either the whole space or a bounded smooth domain. In the case of non-empty boundary, we impose the zero Dirichlet boundary condition. We assume that the potential function may vanish at some points, so that there are no reactions at these points. Our aim is to study whether these zeros of the potential can be singular points, if the solution develops singularities in finite time. Intuitively, it seems that the answer is negative. However, the answer can be either positive or negative. We shall focus on two types of singularity: blow-up and quenching. Some open questions shall also be given.

This talk is based on joint works with Chang-Shou Lin, Masahiko Shimojo and Philippe Souplet.