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Solution of a nonlinear heat equation with arbitrarily given blow-up points. (English)

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Summary: We consider the equation

$$u(0, x) = \varphi(x), \quad u_t = u_{xx} + |u|^{p-1}u \text{ on } [0, T) \times I, \quad u = 0 \text{ on } [0, T) \times \partial I, \quad (1)$$

where $I \subset \mathbb{R}$, u is scalar-valued and $p > 1$. It has been proven that if $u(t)$ blows up at time T , the blow-up points are finite in number and located in $\overset{\circ}{I}$.

Our aim is to prove that this result is optimal. That is, for any given points x_1, \dots, x_k in $\overset{\circ}{I}$, there is a solution u such that its blow-up points are exactly x_1, \dots, x_k .

MSC:

[35B40](#) Asymptotic behavior of solutions to PDEs

[35K60](#) Nonlinear initial, boundary and initial-boundary value problems for linear parabolic equations

[35B35](#) Stability in context of PDEs

Cited in **52** Documents

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[blow-up points](#); [semilinear heat equation](#)

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