

Global Solution and Blow-up of a Semilinear Heat Equation with Logarithmic Nonlinearity

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We study the initial boundary value problem of a semilinear heat equation with logarithmic nonlinearity. By using the logarithmic Sobolev inequality and a family of potential wells, we obtain the existence of global solution and blow-up at $+\infty$ under some suitable conditions. On the other hand, the results for decay estimates of the global solutions are also given. Our result in this paper means that the polynomial nonlinearity is a critical condition of blow-up in finite time for the solutions of semilinear heat equations.