

# Exact dead-core rates for a semilinear heat equation with strong absorption in $\mathbf{R}^N$

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We study the Cauchy problem for a semilinear heat equation with strong absorption  $u_t = \Delta u - u^p$  in  $\mathbf{R}^N \times (0, T)$ , where  $0 < p < 1$ . It is known that a solution develops a dead-core in finite time for a large class of initial data and the dead-core rate is not self-similar rate in the one-dimensional Cauchy-Dirichlet problem in a bounded interval under certain assumptions on initial data. Recently, J-S. Guo and C-C. Wu constructed some solutions exhibiting the exact dead-core rates for the one-dimensional Cauchy problem. Our study provides the higher dimensional version of their work. The proof is based on matched asymptotic analysis and the degree theory.