Capacitary estimates of solutions of semilinear parabolic equations

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We prove that any positive solution of $\partial_t u - \Delta u + u^q = 0$ $(q > 1)$ in $\mathbb{R}^N \times (0, \infty)$ with initial trace $(F, 0)$, where F is a closed subset of $\mathbb{R}^N$ can be represented, up to two universal multiplicative constants, by a series involving the Bessel capacity $C_{2/q,q'}$. As a consequence we prove that there exists a unique positive solution of the equation with such an initial trace. We also characterize the blow-up set of $u(x,t)$ when $t \downarrow 0$, by using the "density" of F expressed in terms of the $C_{2/q,q'}$-capacity.