SOME QUENCHING PROBLEMS FOR ω-DIFFUSION EQUATIONS ON GRAPHS WITH A POTENTIAL AND A SINGULAR SOURCE

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Abstract: In this paper, we study the quenching phenomenon related to the ω-diffusion equation on graphs with a potential and a singular source

$$u_t(x,t) = \Delta_\omega u(x,t) + b(x)(1 - u(x,t))^{-p},$$

where Δ_ω is called the discrete weighted Laplacian operator. Under some appropriate hypotheses, we prove the existence and uniqueness of the local solution via Banach fixed point theorem. We also show that the solution of the problem quenches in a finite time and that the time-derivative blows up at the quenching time. Moreover, we estimate the quenching time and the quenching rate. Finally, we verify our results through some numerical examples.

Keywords and Phrases: Quenching, ω - diffusion equation, quenching rate, graph.

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