

**ASYMPTOTIC BEHAVIOUR OF THE BLOW-UP TIME FOR
NONLOCAL DIFFUSION PROBLEM
WITH SOME PARAMETERS**

Halima. Nachid and Yoro. Gozo

Université Nangui Abrogoua, UFR-SFA,
Département de Mathématiques et Informatiques,
02 BP 801 Abidjan 02, (Côte d'Ivoire)

E-mail : halimanachid@yahoo.fr, nachid.h@iugb.edu.ci, yorocarol@yahoo.fr

Orcid : <https://orcid.org/0000-0003-1244-8139>

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Abstract: This paper concerns the study of the following parabolic equation

$$(P) \begin{cases} u_t - \varepsilon(J * u - u) = \gamma f(u) & \text{in } \Omega \times (0, T), \\ u = 0 & \text{on } (\mathbb{R}^N - \Omega) \times (0, T), \\ u(x, 0) = u_0(x) > 0, & \text{on } \Omega, \end{cases}$$

where $J * u(x, t) = \int_{\mathbb{R}^N} J(x - y)u(y, t)dy$, $J: \mathbb{R}^N \rightarrow \mathbb{R}_+$ is nonnegative, and symmetric function ($J(z)=J(-z)$) bounded and $\int_{\mathbb{R}^N} J(z)dz = 1$, the initial data $u_0(x) \in C^0(\Omega)$, and γ is a positive parameter. We find some conditions under which the solution of semidiscrete form of the above problem blows up in a finite time and estimate its semi-discrete blow-up time. We also prove the convergence of the semidiscrete form blow-up time to the real one when the mesh size tends to zero. Finally, we give some numerical results to illustrate our analysis.

Keywords and Phrases: Nonlocal diffusions, blow-up, numerical blow-up time, blow-up time, asymptotic behavior.

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