

# New phenomenas for degenerate nonlinear cross system with convective transfer and absorption

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**Abstract:** The purpose of this article is to investigate properties of the process of a nonlinear diffusion-reaction with heterogeneous density in the domain  $Q = \{(t, x) : t > 0, x \in R^N\}$ :

$$(1) \quad \begin{aligned} \frac{\partial u}{\partial t} &= \operatorname{div} \left( v^{m_1-1} |\nabla u^k|^{p-2} \nabla u \right) - \operatorname{div}(c(t)u) - \gamma_1(t)u^{\beta_1}, \\ \frac{\partial v}{\partial t} &= \operatorname{div} \left( u^{m_2-1} |\nabla v^k|^{p-2} \nabla v \right) - \operatorname{div}(c(t)v) - \gamma_2(t)v^{\beta_2}, \end{aligned}$$

$$(2) \quad u(0, x) = u_0(x) \geq 0, v(0, x) = v_0(x) \geq 0, x \in R^N$$

where  $k \geq 1$ ,  $p$ ,  $m_i$ ,  $\beta_i$ ,  $i = 1, 2$  - given positive numbers,  $\nabla_x(\cdot) - \operatorname{grad}(\cdot)$ ,

functions  $u_0(x)$ ,  $v_0(x) \geq 0$ ,  $x \in R^N$ ,  $0 < \gamma_i(t) \in C(0, \infty)$ ,  $i = 1, 2$ .

The system (1) describes a set of physical processes, for example process of mutual reaction - diffusions, heat conductivity, a polytropical filtration of a liquid and gas in the nonlinear environment whose capacity equal to  $\gamma_1(t)u^{\beta_1}$ ,  $\gamma_2(t)v^{\beta_2}$ . Particular cases ( $k = 1$ ,  $p = 2$ ) of the system were considered in works (see for instance [1-3]).

In this work is established the estimate of a weak solution, the Fujita type critical exponent, a global solvability of solution, the phenomena of a finite speed of perturbation of disturbance, space localization, localized a wave type structure.

## REFERENCES

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