NONLINEAR MODEL OF QUASI–STATIONARY PROCESS IN CRYSTALLINE SEMICONDUCTOR

B. JUAREZ-CAMPOS, ELENA KAIKINA AND HECTOR F. RUIZ-PAREDES

Abstract. We consider the question of global existence and asymptotics of small, smooth, and localized solutions of a certain pseudoparabolic equation in one dimension, posed on half-line $x > 0$,

\[
\begin{align*}
(1 - \partial_x^2) u_t &= \partial_x^2 (u + \alpha_2 (|u|^{q_2} u)) + \alpha_1 |u|^{q_1} u, \quad x \in \mathbb{R}^+, \ t > 0, \\
\quad &\quad u(0, x) = u_0 (x), \ x \in \mathbb{R}^+, \\
\quad &\quad u(0, t) = h(t),
\end{align*}
\]

where $\alpha_i \in \mathbb{R}, q_i > 0, i = 1, 2, u : \mathbb{R}_+^+ \times \mathbb{R}_+^+ \in \mathbb{C}$. This model is motivated by the wave equation for media with a strong spatial dispersion, which appear in the nonlinear theory of the quasi-stationary processes in the electric media. We show that the problem (0.1) admits global solutions whose long-time behavior depend on boundary data. More precisely, we prove global existence and modified by boundary scattering of solutions.


Keywords and phrases: nonlinear pseudoparabolic equation, initial-boundary value problem, global-in-time analysis, asymptotics of solutions.

REFERENCES


