CONTINUOUS DEPENDENCE
ON THE PARAMETERS OF
PHASE FIELD EQUATIONS

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Abstract
Phase field equations are analyzed. It is shown that the solution of the
problem considered depends continuously on changes in the parameters.

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Continuous dependence.

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1. Introduction
We consider the problem
(1) \[ \tau \phi_t - \xi^2 \Delta \phi + f(x, \phi) = 2u + h_1(x, t), \quad (x, t) \in Q_T \]
(2) \[ u_t + \frac{1}{2} \phi_t = K u + h_2(x, t), \quad (x, t) \in Q_T \]
(3) \[ \phi |_{\Gamma} = \phi_0(x, t), \quad u |_{\Gamma} = u_0(x, t), \quad (x, t) \in \partial \Omega \times (0, T] \]
(4) \[ \phi(x, 0) = \phi_0(x), \quad u(x, 0) = u_0(x), \quad x \in \Omega, \]
where \( Q_T = \Omega \times (0, T], \quad T > 0, \quad \Omega \subset \mathbb{R}^n, \quad (n \geq 1) \) is a bounded domain with a sufficiently
smooth boundary, \( \partial \Omega; \xi, \tau, l \) and \( K \) are positive constants characterizing the length
scale, the relaxation time, the latent heat and the thermal diffusivity, respectively. Also,
\( \phi_0(x), \ u_0(x), \ \phi(x, t), \ u(x, t), \ h_1(x, t), \ h_2(x, t) \) and \( f(x, s) \) are given functions.

In [1], G. Caginalp considered the following system of equations as a model describing
the phase transitions with a separation surface of finite thickness:
(5) \[ \tau \phi_t = \xi^2 \Delta \phi + \frac{1}{2}(\phi - \phi^3) + 2u, \quad x \in \Omega, \quad t \in \mathbb{R}^+ \]
(6) \[ u_t + \frac{1}{2} \phi_t = K u, \quad x \in \Omega, \quad t \in \mathbb{R}^+. \]

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