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Nonlinear Wave Equations with Strong Dissipation and Proliferation

Abstract

In this talk we consider initial-Neumann boundary value problem of nonlinear evolution equations with strong dissipation and proliferation arising in mathematical biology formulated as

$$(NE)\begin{cases} u_{tt} = D\nabla^2 u_t + \nabla\cdot(\chi(u_t, e^{-u})e^{-u}\nabla u) + \mu_1 u_t(1-u_t) \\ \qquad\qquad in \quad (x,t) \in \mathbf{\Omega}\times(0,\infty) & (1.1) \\ \dfrac{\partial}{\partial\nu}u|_{\partial\mathbf{\Omega}} = 0 \qquad\qquad on \quad \partial\mathbf{\Omega}\times(0,\infty) & (1.2) \\ u(x,0) = u_0(x), u_t(x,0) = u_1(x) \qquad in \quad \mathbf{\Omega} & (1.3) \end{cases}$$

where constants D, μ_1 are positive, $\mathbf{\Omega}$ is a bounded domain in R^n with a smooth boundary $\partial\mathbf{\Omega}$ and ν is the outer unit normal vector. We show the existence and asymptotic behavior of the solution. Under some conditions of the coefficient $\chi(u_t, e^{-u})$ of (1.1), we can derive the energy esitmate of (NE), which enables us to show the global existence in time of the soluton and asymptotic behaviour. In the case of $\mu_1 = 0$, we already dealt with the problem in [**?**] and we could improve the result in this talk. We apply our result to mathematical models of tumour invasion with proliferation of tumour cells(cf. [**?**]).

Bibliography

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