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Global Existence and Nonexistence for a Strongly Coupled Parabolic System with Nonlinear Boundary Conditions

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摘要   This paper deals with the strongly coupled parabolic system $u_{t}=v^{m}{\Delta}u, v_{t}=u^{n}{\Delta}v,\ (x,t)$ $\in {\Omega}\times (0,T)$ subject to nonlinear boundary conditions ${\partial}u/{\partial}\eta =u^{\al}v^{p},\ {\partial}v/{\partial}\eta =u^{q}v^{\beta},\ (x,t)\in {\partial}{\Omega}\times (0,T)$, where ${\Omega}\subset R^{N}$ is a bounded domain, m,n are positive constants and ${\alpha},\beta,p,q$ are nonnegative constants. Global existence and nonexistence of the positive solution of the above problem are studied and a new criterion is established. It is proved that the positive solution of the above problem exists globally if and only if $\alpha<1$, $\beta<1$ and $(m+p)(n+q)\leq (1-\alpha)(1-\beta)$.

关键词   Strongly coupled   Global existence   Finite time blow-up   Upper and lower solutions

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Abstract This paper deals with the strongly coupled parabolic system $u_{t}=v^{m}{\Delta}u, v_{t}=u^{n}{\Delta}v,\ (x,t)$ $\in {\Omega}\times (0,T)$ subject to nonlinear boundary conditions ${\partial}u/{\partial}\eta =u^{\al}v^{p},\ {\partial}v/{\partial}\eta =u^{q}v^{\beta},\ (x,t)\in {\partial}{\Omega}\times (0,T)$, where ${\Omega}\subset R^{N}$ is a bounded domain, m,n are positive constants and ${\alpha},\beta,p,q$ are nonnegative constants. Global existence and nonexistence of the positive solution of the above problem are studied and a new criterion is established. It is proved that the positive solution of the above problem exists globally if and only if $\alpha<1$, $\beta<1$ and $(m+p)(n+q)\leq (1-\alpha)(1-\beta)$.

Key words   Strongly coupled   Global existence   Finite time blow-up   Upper and lower solutions

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