论文

一类非线性波方程初边值问题解的爆破

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摘要：

该文研究如下具有非线性阻尼项和非线性源项的波方程的初边值问题

$$u_{tt} - u_{xxt} - u_{xx} - (\sigma(u^2_x)u_x)_x + \delta|u_t|^{p-1}u_t = \mu|u|^{q-1}u, \quad 0 < x < 1, \; 0 \le t \le T, \qquad (0.1)$$
$$u(0, t) = u(1, t) = 0, \quad 0 \le t \le T, \qquad (0.2)$$

$$u(x, 0) = u_0(x), \quad u_t(x, 0) = u_1(x), \quad 0 \le x \le 1. \qquad (0.3)$$

文章将给出问题(0.1)--(0.3)的解在有限时刻爆破的充分条件, 同时将证明问题的局部广义解和局部古典解的存在性和唯一性.

关键词： 非线性波方程　初边值问题　局部解　解的爆破
分类号：

35L35; 35L75; 35G30

Blow-up of |Solutions |of |an |Initial |Boundary |Value Problem for a Class of Nonlinear Wave Equation

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Abstract:

In this paper, the following initial boundary value problem of the nonlinear wave equation involving the nonlinear damping term and the
nonlinear source term

$$u_{tt} - u_{xxt} - u_{xx} - (\sigma(u^2_x)u_x)_x + \delta|u_t|^{p-1}u_t = \mu|u|^{q-1}u, \quad 0 < x < 1, \; 0 \le t \le T,$$
$$u(0, t) = u(1, t) = 0, \quad 0 \le t \le T,$$

$$u(x, 0) = u_0(x), \quad u_t(x, 0) = u_1(x), \quad 0 \le x \le 1$$

is discussed. This paper gives sufficient conditions of blow-up of the solutions for the problem in finite time and proves the existence and uniqueness of the local generalized solution and classical solution of this problem.

Keywords: Nonlinear wave equation　Initial boundary value problem　Local solution　Blow-up of solution

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