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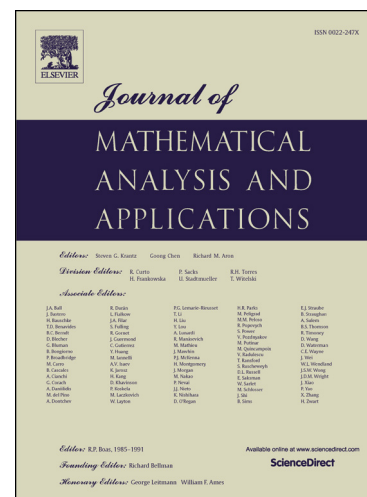
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# Existence and asymptotic stability of time periodic solutions to the generalized double dispersion equation with periodic external force

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## Abstract

In this paper, we investigate the generalized double dispersion equation with periodic external force in  $\mathbb{R}^n$ . We prove the existence and uniqueness of time periodic solutions that have the same period as the external force in some suitable function space for the space dimension  $n \geq 3$ . The proof is based on the spectral analysis for the solution operator and the contraction mapping theorem. In addition, we also discuss the time asymptotic stability of the time periodic solutions by continuous argument.

**2010 Mathematics Subject Classification:** 35L30, 35B40.

**Keywords:** generalized double dispersion equation with periodic external force, time periodic solutions, asymptotic stability.

## 1 Introduction

In this paper, we investigate existence, uniqueness and stability of time periodic solutions to the following generalized double dispersion equation with periodic external force

$$u_{tt} - \Delta u_{tt} - \mu \Delta u_t - \nu \Delta u + \Delta^2 u = \Delta f(u) + \Delta g(x, t) \quad (1.1)$$

Here  $u = u(x, t)$  is the unknown function of  $x \in \mathbb{R}^n$  and  $t > 0$ ,  $\mu > 0, \nu > 0$  are constants. The nonlinear term  $f(u) = O(u^2)$ . The function  $g$  is a periodic function with period  $T$ , i.e.  $g(x, t + T) = g(x, t)$ .

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