

LIPSCHITZ STABILITY OF AN INVERSE SOURCE PROBLEM FOR ADMB-KDV EQUATION

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ABSTRACT. The paper is concerned with the inverse source problem for an ADMB-KdV equation, which describes the nonlinear waves generated by a long-wave instability in a viscous film flowing down an inclined rigid surface. The inverse problem aims to determine a spatially varying source function from internal observation data on a suitable subdomain and the whole spatial observation data at a time. We first prove a Carleman inequality for ADMB-KdV equation, and then apply this Carleman inequality to derive Lipschitz stability for this inverse source problem.

1. Introduction

Let $\Omega = \Omega_x \times \Omega_y$ with $\Omega_x = \Omega_y = (0, 1)$ and $\Omega_T = \Omega \times (0, T)$, $\Gamma = \Gamma_x \cup \Gamma_y$ with $\Gamma_x = \partial\Omega_x \times \Omega_y \times (0, T)$ and $\Gamma_y = \Omega_x \times \partial\Omega_y \times (0, T)$. Then we consider the following anisotropic dissipation-modified Boussinesq-KdV (ADMB-KdV) equation [13]

$$(1.1) \quad u_t + \alpha u_{xxxx} - \beta u_{yy} + \nu u_{xxx} + uu_x = g, \quad (x, y, t) \in \Omega_T,$$

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