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THE KORTEWEG-DE VRIES EQUATION IN A QUARTER PLANE, CONTINUOUS DEPENDENCE RESULTS*

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Abstract. Considered herein is an initial- and boundary-value problem that arises in modeling the propagation of small-amplitude, long waves generated by a wavemaker at one end of a homogeneous stretch of nonlinear, dispersive media. The principle accomplishment is to show that the solutions to this problem depend continuously in strong norms on both the initial and the boundary data.

1. Introduction. This paper is a continuation of an earlier one (Bona and Winther 1983) in which an initial- and boundary-value problem for the Korteweg-de Vries equation was analysed. This classical model appears in the study of small amplitude, long wave propagation in an impressive variety of physical situations. It was argued in this previous work that the problem

$$u_t + u_x + uu_x + u_{xxx} = 0, \quad \text{for } x, t \geq 0 \tag{1.1a}$$

with

$$u(x,0) = f(x), \quad \text{for } x \geq 0, \quad u(0,t) = g(t), \quad \text{for } t \geq 0, \tag{1.1b}$$

is especially interesting and apropriate as regards the use of this equation in situations where a wavetrain is created at one end of and travels into an undistured patch of the medium of propagation. A common example to which the Korteweg-de Vries equation might be expected to apply arises in a flume with a wavemaker afixed at one end which, when appropriately oscillated, generates unidirectional, small amplitude, long waves that travel down the channel (cf. Bona, Pritchard and Scott 1981, Hammack and Segur 1974 and Zabusky and Galvin 1971).

The problem posed in (1.1) has been investigated by Bona and Heard, as well as in the present authors' earlier paper. The work of Bona and Heard provides existence of relatively weak solutions corresponding to weak assumptions on the initial and boundary data f and

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