1023-76-400 **Samuel S Shen*** (shen@math.sdsu.edu), Department of Mathematics and Statistics, San Diego State University, San Diego, CA 92182. *Approximate and Numerical Solutions of the Initial- and Boundary-Value Problems for fKdV Equation, Mass Postulate, and Satellite Observations.*

Over 25 years ago, Ted Wu of Caltech and his colleagues numerically and experimentally found that a transicritical water flow over bump generates a train of upstream-advancing solitons, a depression zone at the downstream of the topography, and a wave zone further downstream. Wu attributed this intriguing phenomenon to the solutions of several mathematical models, including the forced Kortweg-de Vries (fKdV) equation. Wu (1987, J. Fluid Mech, vol.184, 75-99) postulated that the excess mass of the upstream-advancing solitons comes almost entirely from the region of surface depression (pp.81-82). With this postulate, the depth of the downstream depression zone can be found from the solvability condition of a boundary value problem of an ordinary differential equation, and approximate solutions of the fKdV equation can be found. The approximation involves epsilon-invariant theorem and infinitely many choices of epsilon values. The physically meaningful size of epsilon is in the range of 0.4-0.7, excluding values close to zero (Shen, 1992, J. Fluid Mech., vol. 234, 583-612). The satellite observations of the upstream-advancing solitons in the atmosphere over Hainan Island, China will also be reported (Zheng et al., 2004, Int. Journal of Remote Sensing, vol. 25, 4433-4440). (Received September 11, 2006)