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NUMERICAL SOLUTION OF THE FORCED KORTEWEG de VERIES EQUATION BY QUINTIC B-SPLINE COLLOCATION METHOD

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Abstract

When fluid flow is disturbed by a small bump it can generate surface wave. Many times researcher has studied the transcritical flow of fluid over a localized obstacle, which generates upstream and downstream nonlinear wave trains. The flow has been successfully modeled in the framework of the forced Korteweg deVries (fKdV) equation, where numerical and asymptotic analytical methods are the only method for solving it. In this paper a quintic B-spline collocation method is developed to solve the fKdV representing a surface elevation of fluid owing on a channel with a small bump at the bottom. We present the technique to solve the equation. The method is first applied to the KdV equation and compares the result with the exact solution which is known to us. Then we solved the fKdV equation by the proposed method to demonstrate the nonlinear wave trains of water surface generated by the forcing term.

Key Words : B-spline, Collocation, Downstream, Undular bore, Upstream.