

## **Flow Computation of River Estuaries Using Finite Element Model**

***Ramakar Jha, N. C. Ghosh and B. Chakraborty***

### **ABSTRACT**

A large percentage of our population live in coastal areas. In coastal areas, where complex interaction between physical, chemical and biological processes are found, water circulation is one of the most important factors controlling those processes. Thus, the study of the actual hydrodynamic regime and proper management of estuaries, lagoons and coastal regions due to high tides, peak flows erosion sedimentation and pollutant load discharged are essential

Many problems of hydraulic engineering require information concerning water heights and currents in the two-dimensional horizontal domain. Typical cases involve bays, estuaries, harbours and wide rivers. Recent advances in computation technology allow us to use sophisticated numerical methods for the analysis of such problems. Because of the relative ease and economy of computations on one hand and the ever growing demand for reliable information on the other hand, mathematical modelling has become a useful tool in the field of hydraulic engineering. In the beginning, the modelling was carried out by finite difference methods. But the complex topography and irregular boundaries of two-dimensional cases require a better and more reliable scheme if detailed information is desired. The finite element technique meets the above requirement. In recent years, the finite element method has been used to develop two-dimensional models for the simulation of bays, estuaries, harbours and lakes.

In the present study a hydrodynamic two-dimensional model (FESWMS-2DH) has been used to compute the two dimensional flow velocity and water surface profiles due to interaction of high tide and peak flow from the Saptmukhi river estuary(east and west gullies) and Storage Lacam's channel of the Western Sundarbans Delta of West Bengal. In the Western area there are inadequate security against tides and waves resulting in occasional damage of apps, loss of life and property, difficulties in maintaining the huge length of embankments, lack of proper drainage facilities and insufficient sweet water resources. All these deficiencies have provided hindrance to an all-round development of the region which has immense potentialities otherwise.

The present study is aimed to (i) compute the effect of tides (neap tides and spring tides), (ii) effect of different flow conditions (normal and peak flow conditions) and (iii) sensitivity of model parameters. The results obtained have been compared with the observed flow data of the river estuary.

