Geophysical Research Abstracts, Vol. 7, 02198, 2005
SRef-ID: 1607-7962/gra/EGU05-A-02198
© European Geosciences Union 2005

New analytical equations describing tidal propagation in estuaries.

H. Savenije

Delft University of Technology, P.O. Box 5048, 2600 GA, Delft, Netherlands

The hydraulics of tidal flow in estuaries can be adequately described by the one-dimensional St. Venant equations. The main-stream method to derive analytical relations between hydraulic and geometric parameters from the St. Venant equations is the "perturbation" approach. In this approach higher order effects are filtered from the St. Venant equations after which solutions of the simplified equations are found. In this paper another approach is followed. Depending on the phenomenon at hand, the full equations are applied to a specific situation. For instance for the situation of high water slack (HWS) or high water (HW) the equations are substantially less complex and can often be solved analytically under reasonable assumptions such as: a small Froude number and a small Canter-Cremers number. In this paper, six new analytical equations are presented, which can be applied to any natural estuary, and which differ from their "classical" counterparts on various aspects. The most important is that the effect of tidal damping and of the phase lag between HW and HWS is fully taken into account. Applications of the equations to observations are presented as an illustration.