

A method to determine the design tidal discharge of an estuary

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Abstract Water in an estuary moves back and forth in a tidal period, i.e. there are two tidal phases, the flood tide and the ebb tide. As a result, tidal discharge at any cross-section of the estuary cannot be measured on a continuous basis due to the difficulties in measuring. Therefore, there is a need to explore an approach to determine the design tidal discharge using incomplete data series of tidal discharge. This paper selected the Xuliujing cross-section of the lower reach of the Changjiang River as a case study site, and proposes a method to compute design tidal discharge based on the correlation analysis between tidal discharges and tide levels. This method integrated unsteady flow calculation, correlation analysis and frequency analysis so that stable design tidal discharges with definite frequencies can be derived. The research results have been adopted in the preliminary design of the Suzhou-Nantong Changjiang River bridge, which is only 2 km away from the Xuliujing cross-section, and will provide a beneficial reference for other similar estuary studies.

Key words correlation analysis; design tidal discharge; estuary; frequency analysis; tidal level; tidal range
