



Relationship between Estuary Shape and Hydrodynamics in Alluvial Estuaries

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Generally research on morphology and hydrodynamics in estuaries is done separately: the hydrodynamics is studied for a given geometry, and the morphology is studied for given hydrodynamics. 3-D morphological models indeed integrate morphology and hydrodynamics, but this is forward modelling, not aimed at understanding why certain relations in nature exist. Until now, little research has been done on identifying the relationship between estuary shape and hydrodynamics in alluvial estuaries. In this research, the aim is to develop an analytical model to relate tidal characteristics and flood discharge signatures to estuary shape. By this, engineers would be able to estimate flood discharge characteristics in an estuary from estuary shape indicators. This could be very useful to predict flood the discharge in ungauged estuaries.

Data from 16 estuaries around the world have been analyzed to develop and test the analytical relationship. From the analysis, it shows that the shape of estuaries indeed depends on a characteristic flood discharge, the tidal range, the depth and the celerity of the tidal wave. Besides that, other parameter such as sediment sizes will also be included into analysis which also affects the morphodynamics of the estuary. In order to verify the accuracy and reliability of the model, more data on the morphology and hydrodynamics are required. Thus, in this research, about 18 estuaries in Malaysia will be studied and included into the analysis to validate the model. Meanwhile, existing available data from other estuaries worldwide will be collected simultaneously to expand the database.

Keywords: morphology, hydrodynamics, estuary shape, tidal range, wave celerity, analytical model