

Effects of Structure on Density-Induced Flow in Coastal and Estuarine Navigation Channel

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Abstract : In navigation channels located in coasts and estuaries as the waterways connecting coastal water to ports or harbors, density-induced flow often exist due to the density-gradient or gravity gradient as the results of mixing between fresh water from coastal rivers and saline water in the coasts. The density-induced flow often carries sediment transport into navigation channels and causes sediment depositions in the channels. As a result, expensive dredging may need to maintain the water depth required for navigation. In our study, we conduct a series of experiments to investigate the characteristics of density-induced flow in the estuarine navigation channels under different density gradients. Empirical equations between density flow and salinity gradient were derived. Effects of coastal structures for regulating navigation channel on density-induced flow have also been investigated. Results will be very helpful for improving the understanding of the characteristics of density-induced flow in estuarine navigation channels. The results will also provide technical support for cost-effective waterway regulation and management to maintain coastal and estuarine navigation channels.

Keywords : density flow, estuarine, navigation channel, structure

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