

The nonlinear effect and numerical model study for offshore storm surge

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Abstract

Offshore shallow water region, due to the complex changes of the seabed terrain and land border, the nonlinear effects of the astronomical tidal should be considered, particularly in Qiantang river mouth where a discontinued tidal bore wave is generated. To study storm surge with this background of the astronomical tidal field, We should pay attention to the nonlinear effect. We have studied the offshore storm surge around mainly three aspects: 1. The nonlinear interaction mechanism is analyzed between the storm surge and the astronomical tidal in the shallow water region, and it is important of the nonlinear effect to the change of water level in the offshore region; 2. As the research foundation of the strong nonlinear effect in the offshore shallow water region, the phenomenon of discontinuity wave (tidal bore, dambreak wave, landslide bore) of hydrodynamics is analysed; the attachment condition of torrent shock wave and flat shock wave have been obtained, and the fast computing methods have been designed for solving physics variants; the law of generating and propagating of the landslide bore is analyzed; the high order and high resolution computational methods are studied for the hydrodynamics discontinuous wave based upon the global homeomorphic boundary fitting grid and stagger grid; 3. The high order and high resolution storm surge forecasting model is built up with unstructured mesh, and it is tried to apply to the numerical forecast of storm surge at Zhujiang Delta.