

## ABSTRACT

Sediment prevention structures such as underwater sill (UWS) may be used to divert the sediment movement, and prevent it to enter the port basin or navigation channel. In this study, a quasi 3D-numerical model called multi-layered model is utilize in other to simulate the current and suspended sediment that are affected by underwater sill.

The model consisted of two main. There are the hydrodynamic model that was based on characteristic method and suspended sediment model that was based on particle tracking method. A straight channel with an UWS approximately a half way between upstream and downstream boundaries was simulated. The height of the UWS as well as the sediment parameter which is presented as the rouse number were varied to observe the effectiveness of such structure against sedimentation. The influence of UWS on current and sedimentation pattern, vertical distribution of suspended sediment concentration, and the implication of effectiveness of underwater sill structures to control the flow and reduce sedimentation were analyzed.

The numerical simulations indicated that the UWS significantly altered the current and sediment transport pattern. The capability of UWS in deflecting the current and sediment increase along with the increment of UWS height. It presence contributes in reducing the sediment transport that cause siltation problem in port basin. The amount of siltation's reduction provide by UWS with the smallest height ( $h_{uws} = 1/7 h$ ) was 45% for sediment with rouse number of 1.8, 15 % for sediment with rouse number of 1.2, and only 1 % for sediment with rouse number of 0.8. The siltation's reduction is increase as the increasing of UWS height.

**Key Words:** Sediment transport, Underwater sill (UWS), Method of Characteristics, Particle tracking method, Numerical Simulation.