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ROV Based Condition Monitoring Quay Wall Bottom and Maneuverability effect of vessels with large draft and thruster in Shahid Rajaee harbor

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Abstract:

The size of the ships which navigate in seas and inland waterways is increasing, mainly for economic reasons. A bigger ship needs a bigger thrust force to push it forward. Large vessels with the powerful propellants usually equip a bow thruster for effective ship operation. Subsequently a higher velocity propeller wash is induced. However these thrusters generate the strong current which may cause a local scour in front of a quay wall and affect its stability. The loads on bottom protection differ, because of diversity in shipping and tidal motion. This paper reports the development of a new remotely operated vehicle (ROV) based test facility and purpose-built by the authors to investigate unsteady dynamics of large marine thrusters on the profile of sedimentations near a quay wall of Shahid Rajaee harbor. Laboratory experiment has been conducted to measure the local scour due to jet-like strong current which simulates, the strong current due to main and bow thrusters. The demands of stability required to guarantee a stable and safe bottom protection, this bottom protection is studied with soundings.

Key Words: *Quay wall, Bottom protection, Large vessels, thrusters, monitoring, ROV based test bed, Propeller simulation,*

1-Introduction:

For the last 15 years there has been an increase of the loads on the harbour bottom. This increase is caused by the propeller loads of mooring and unmooring container vessels. At first, this increase is ascribed to the scaling-up of the vessels. This means more arrivals and departures of vessels with larger draft, larger thruster diameters and larger available thruster-power and also the increase in manoeuvrability of the container vessels, because they obtain bow-thrusters. On the other hand currently much uncertainty exists in the reliability of the present design formulas that are required to design a stable bottom protection near a quay wall.

The consequences of this become visible during the maintenance-phase of the quay wall. To guarantee public safety during the lifetime of a quay wall and to make an optimal economical design it is necessary to design the bottom protection and a quay wall integrally. The local scour in front of the quay wall may affect its stability, and therefore a use of the bow thruster is often restricted (Fig 1). In the frame of trilateral partnership between Offshore IT Mechatronic co. (Iran)-Onyx Engineering (Malaysia) and Port and Marine Organization (Iran)