

How propeller suction is the dominant factor for ship accidents at shallow water conditions

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The laminar flow comes to the fore with the disappearance of the several other directions in the internal displacements in the water current. Due to the dominant speed direction during the straightforward motion of the ship, the underwater hull is associated with the continuous flow of laminar currents. The open marine environment acts as a compressible liquid medium because of the presence of many variables about water volume overflow boundaries where the ship is associated. Layers of water rising over the sea surface due to ship's body and the propeller's water push provides loss of liquid lifting force for the ship. These situations change the well-known sea-floor morphology and reliable depth limits, and lead to probable accidents. If the ship block coefficient for the front side is 0.7 or higher, the "squat" will be more on the bow, because the associated factor "displacement volume" causes to the low-pressure environment due to large and rapid turbulence. Thus, the bow sinks further, which faced with liquid's weaker lift force.

The vessels Gerardus Mercator, Queen Elizabeth and Costa Concordia had accidents because of unified reasons of squat, fast water mass displacement by hull push and propeller suction interaction. In the case of water mass displacement from the bow side away, that accident occurred in 2005 by the vessel Gerardus Mercator with excessive longitudinal trim angularity in the shallow water.

The vessel Costa Concordia (2012), voluminous water displaced from the rear left side was an important factor because of the sharp manoeuvre of that the captain made before the accident. Observations before the accident indicate that full-speed sharp turn provided listed position for the ship from left (port side) in the direction of travel before colliding and then strike a rock on the sloping side of the seabed. The reason why the ship drifted to the left depends mainly the water discharge occurred at the left side of the hull during left-hand rudder control. Additionally the second water drainage from the shallow ridge area by the propeller's left-directed suction created a shallower environment. Similar situation for example collision of two ships during their side by side forward motions; their positions will be approached and listed to each other more same as downslope movement because of the shared area's water level collapse occur more by two propeller's suction.