UNIVERSITI TEKNOLOGI MARA

# HULL DESIGN AND STABILITY OF MULTI- PURPOSE SMALL-SCALE TERENGGANU FISHING BOAT

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# ABSTRACT

The configuration and stability of a hull are essential in maritime engineering, as they significantly affect a vessel's safety, efficiency, and functional adaptability. Typical small-scale fishing boats found in Terengganu, Malaysia, often do not possess the required stability for diverse uses such as scuba diving or tourism, leading to concerns regarding safety and operational inefficiencies. This research aims to tackle these issues by devising an optimized hull design that is appropriate for multiple marine activities while prioritizing safety, efficiency, and sustainability.

A displacement monohull was chosen due to its superior stability, fuel efficiency, and versatility. The hull was modeled using Rhino and PolyCAD, which facilitated precise 3D surface modeling and hydrostatic assessments. An analysis of hydrodynamic performance and stability was performed with PolyCAD to ensure adherence to marine safety regulations. Empirical calculations were utilized to confirm the simulation findings, concentrating on metacentric height (GM), righting moment, and buoyancy characteristics.

The key results reveal that a monohull design with refined dimensions (length: 12.1 m, beam: 2.72 m, draft: 1 m, depth: 2.035 m) enhances stability, safety, and fuel efficiency, making it ideal for both fishing and tourism endeavors. Moreover, considerations for sustainability, including low-drag hull designs and environmentally friendly materials, were integrated to minimize environmental impact. By addressing the needs for versatility and advancing sustainable practices, the results make a noteworthy contribution to the design of small-scale vessels within the larger context of marine engineering.

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