

**“Modification of Wave-Piercing Hull Addition on High-Speed Trimaran to Improve Resistance Performance”**

Oleh : Johanes Enggal Putra Hape  
Departemen : *Naval Architecture*  
Dosen Pembimbing : 1. Dr. Deddy Chrismianto, S.T., M.T.  
2. Prof. Dr. Eng. Ahmad Fauzan Zakki,  
S.T., M.T., IPM., MRINA

***ABSTRACT***

*This study aims to evaluate the effect of adding a wave piercing hull on the drag performance of a trimaran speedboat through Computational Fluid Dynamics (CFD) simulation based on the Reynolds-Averaged Navier-Stokes (RANS) method. Modifications were made by adding 2%, 4%, and 6% of the length of the waterline (LWL) to the wave piercing hull to determine the most effective configuration in reducing total drag. The simulation was performed using Ansys Fluent software, with domain and boundary condition configurations referring to ITTC standards, and validated through comparison with experimental data to ensure the accuracy of the results. The results showed that variations in the length of the wave piercing hull had a significant effect on ship resistance, especially wave and friction resistance. A 4% LWL variation resulted in a 46.57% reduction in total resistance compared to the original model. Wave resistance decreased dramatically by up to 87.7%, while friction resistance increased with the addition of wave piercing length. Although friction resistance increased, its contribution to total resistance was relatively small, while the reduction in wave resistance was much more significant. The validation results showed that the CFD simulation had good accuracy, with a relative difference of 9.6% compared to the empirical method. This study indicates that the addition of a wave piercing hull can significantly improve the hydrodynamic efficiency of trimaran speedboats, with a 4% LWL variation as the optimal configuration that provides the greatest reduction in total resistance without excessively increasing the wetted surface area. These findings make an important contribution to the development of speedboat designs with better fuel efficiency and higher performance.*

*Keywords : High Speed Craft, Wave Piercing, CFD, Trimaran*