

# Could one Lower the Fuel consumption of Naval Vessels by Increasing their Beams

Sander Çalışal<sup>1,3,,</sup> Ömer Gören<sup>2</sup>

<sup>1</sup> University of British Columbia, Kanada, <sup>2</sup> Istanbul Teknik Üniversitesi İstanbul Türkiye

<sup>3</sup> Piri Reis Üniversitesi İstanbul Türkiye

## ABSTRACT

Conventional mono hull designs and trimarins benefited from the usage of the parabolization of the waterline concept. The possibility of reduction in fuel consumption was verified by model tests in towing tanks and by numerical studies. The experimental research showed that the removal of the parallel middle body by using parabolic waterlines reduced the total drag at moderate Froude numbers. Various add on volumes were used to modify the hull geometry of the models tested during the study. The add on volumes were faired to the existing waterlines.

When numerical results for wave resistance, such as the Michell integral, were compared to the residual resistance values similar trends were observed. The numerical and experimental confirmed that at moderately high Froude numbers Effective Horse Power (EHP) of the ship decreased and the designer had useful additional space and increased intact ship stability. The study showed that parabolization of the waterlines could be used for boats and ships to reduce the horse power requirement and to have additional volume.

Numerical optimization and experimental procedures were used to redesign a trimarin by keeping the length and the displacement of the original hull. This hull offered additional volume for a more powerful main engine and reduced the expected fuel consumption.

The tests also showed that some increase in the form factor of the original hull. Recent results showed that waterline parabolization did not adversely affect the ship motion predictions.