

A. Cirello, C. Damiano, G. Lupo, A. Mancuso, G. Virzi Mariotti

Università degli studi di Palermo, Dipartimento di Meccanica, Viale delle Scienze, 90128

Palermo, Italy, E-mail: virzi@dima.unipa.it; mancuso@dima.unipa.it

SHAPE OPTIMIZATION BY CFD ANALYSIS OF HIGH-SPEED CATAMARAN WITH ASYMMETRIC DEMIHULLS

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Abstract

The present paper proposes and develops an innovative concept of catamaran that is distinguished for an “internal” asymmetry of two demihulls in the longitudinal direction, given by flat external walls and internal surfaces determining a convergent-divergent tunnel, whose section to the floating plan is the result of a precedent numerical study of 2D-optimization. The final objective of the study is the definition of an optimal geometric solution, through a process of three-dimensional numerical optimization that has allowed, not only an improvement of the previous results, but also the possibility to recover part of the energy yielded to the water in waves making, according to what before hypothesized

The numerical investigations are been performed increasing the speed of advance, in the interval between 0,3 and 0,7 F_n , drawing the curves of total resistance related to three different values of the distance of separation between the two demihulls; the curves show that the optimized hull allows a reduction of the total resistance around 20%, for the whole range of simulated speed.

Key words: catamaran, CFD, shape optimization, towing tank test, motion resistance