1. INTRODUCTION

It is well known that there is a lack of published systematic data and techniques suitable for the conceptual and preliminary design of high-speed ferries. On the contrary, the interest and the applications of high-speed vessels are increased, and so the development of available design process data and properly techniques for their designs are strongly required. In this regards, to avoid major recalculation at later design stages, it is fundamental to develop data and procedures, which can be used for providing the “starting point” to estimate “technical aspects” such as main dimensions, masses value, powering and material choice. First of all the paper presents the analysis of a database, which includes high-speed ferries operating in the world; this analysis permits to present a simplified procedure to individuate feasible and reliable initial calculation for the main dimensions, masses value and materials. Successively, based on Steel and/or Aluminum materials and starting from a representative fast ferries, a parametric hull mass estimation has been carried out using U.N.I.T.A.S. Rules of Bureau Veritas, Registro Italiano Navale and Germanisher Lloyd, both for monohulls and catamarans.

The problem of the first evaluation of the design data and vessel weight is not possible to be faced with strictly statistical instrument due to the data lack explained before. For this, in the present paper, relations obtained by regressions and sometimes from data heuristically analyzed are proposed.

2. DISPLACEMENT AND MAIN DIMENSIONS

Actually, the most important typologies of fast vessel can be synthesized as follows:
- Passengers-only monohull;
- Passengers-only catamaran;
- Passengers and vehicles-monohull;
- Passengers and vehicles-catamaran.

A first tentative displacement datum can be evaluated through the “net weight” regressions. Two examples, showing a clearly trend, have been reported in figure 1 and figure 2, respectively for monohull and catamaran only pax and car/pax. The aim is to estimate the displacement directly from a regression analysis obtained from the available data; this approach prevent the resolution of the classic displacement equation, and supply the experience to the designer directly from the available database.

It is necessary to point out that the size influences mainly the resistance, the longitudinal strength and the seakeeping.
Among these, the resistance and the seakeeping seem to be the most important for the high-speed craft. Therefore, $L_{wl}/BWL, CB , B/T , L_{wl}/BWL$, and consequently $L_{wl}/B$ are based on hull hydrostatic and hydrodynamic requirements ($L_{wl}$ = length water line; $B$ = Breadth; $V$ = Displacement volume; $CB$ = Block coefficient; $T$ = Draught.

In the following, two different procedures for the design of a fast ferry are proposed: the first one applicable to the only passengers vessels (monohull), while the second applicable to the cars/passengers vessels (monohull).

### 2.1 PASSENGERS FERRIES (MONOHULL)

For the first evaluation of the main dimensions of the vessel ($L$, $B$, $T$ and $\Delta$) owner’s specification and some hydrodynamic and hydrostatic requirements have to be considered.

Generally, owner’s requirements are number of passengers - $PN$ - speed and a certain grade of comfort on board.

Particularly, the comfort level determines the amount of deck space for each passenger - $KP1$ - and decks number - $DN$. Moreover, the vessel service influences the space to assign to crew and to sailing services (bridge, mooring equipment area, etc.).

From these data it is possible to determine the following parameters:

- $PA = \text{Passengers area; }$
- $DN = \text{Number of decks; }$
- $KP2 = \text{Percentage of passengers on main deck; }$
- $KP3 = \text{PAMD}/(L_{OA} \times B)$

where PAMD is the main deck area intended to passengers.

PA can be obtained from:

$$PA = PN \times KP \quad (1)$$

$KP1$ will depend on trip duration, service quality and mainly on vessel dimensions. For a rough evaluation of $KP1$ the following expression is suggested:

$$KP1 = 0.00042 \times LOA \times B + 0.909 \quad (2)$$

It seems reasonable to limit the $KP1$ variations in the range ±0.3 m. The dashed lines indicate the limits suggested (see figure 3).

Similar considerations will be applied to determine $KP2$ and $KP3$. In particular, examining 13 vessels sample ($L_{OA} = 33 \div 142$ m; $PN = 220 \div 1500$; $V = 26 \div 43$ kn), the sizes due to the loading and unloading of cars and the areas for different services (exhaust arrangement, techniques area, etc.) have been evaluated. The results show that, for initial general purpose, they could be assumed:

- $KP2$ between 0.55 and 0.75;
- $KP3$ between 0.45 and 0.85.

where $KP2$ and $KP3$ are growing with payload.

Due to the fact that the values of $L_{wl}/BWL, L_{OA}/L_{wl}$ and $B/BWL$ have to be determined, at this stage of procedure, some conceptual considerations about hull shape have to be made.
LWL/BWL is a strategic parameter and the designer will choose it according to stability consideration and his experience. Nevertheless, for fast ferries usually LWL/BWL goes from 5.0 to 7.5.

Regarding B/BWL the data set is small for statistical analysis, taking also into account that some of the data are referred to cars-passenger ferries, whose beam depends strongly on garage geometry.

Figures 4 and 5 show the relation between the vessel length and the parameters LOA/LWL and B/BWL.

In the first stage of design, the evaluation of CB and L/\(\sqrt[3]{\Delta}\) is a very hard task; their values have a great influence on \(\Delta\) and T. If there are not reliable indications, according to our experience and data, we suggest the following relations for determining CB and L/\(\sqrt[3]{\Delta}\):

\[
C_B = 0.11 \text{Fn} + 0.34
\]  
(3)

\[
\frac{L}{\sqrt[3]{\Delta}} = -2.2 \cdot 10^{-4} L_{WL}^2 + 0.057 L_{WL} + 5.0
\]  
(4)

The equation (3) is valid for 0.5 < Fn < 0.9, while equation (4) for 25 m < LWL < 125 m.

For the evaluation of the depth overall D (with superstructures); we can use the following equation:

\[
D = T + 2.7 D_N + 2
\]  
(5)

To explain the proposed procedure, Table 1 shows step by step the proposed calculations.

<table>
<thead>
<tr>
<th>Step</th>
<th>Item</th>
<th>Source</th>
</tr>
</thead>
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<tr>
<td>S1</td>
<td>KP1</td>
<td>Initial hypothesis</td>
</tr>
<tr>
<td>S2</td>
<td>LOA/LWL</td>
<td>Initial hypothesis</td>
</tr>
<tr>
<td>S3</td>
<td>BOA/BWL</td>
<td>Initial hypothesis</td>
</tr>
<tr>
<td>S4</td>
<td>LWL/BWL</td>
<td>Initial hypothesis</td>
</tr>
<tr>
<td>S5</td>
<td>KP3</td>
<td>Initial hypothesis</td>
</tr>
<tr>
<td>S6</td>
<td>KP2</td>
<td>Initial hypothesis</td>
</tr>
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<td>S7</td>
<td>PA</td>
<td>KP1× PN</td>
</tr>
<tr>
<td>S8</td>
<td>PAMD</td>
<td>PA × KP2</td>
</tr>
<tr>
<td>S9</td>
<td>(LOA × BOA) / (LOA/BOA)</td>
<td>PAMD / K3</td>
</tr>
<tr>
<td>S10</td>
<td>KP1</td>
<td>4.2 \cdot 10^{-4} (LOA × BOA) + 0.91 (~0.3 or not)</td>
</tr>
</tbody>
</table>

New loops as long as KP1 is confirmed

Sn | L/\(\sqrt[3]{\Delta}\) = (L_{OA}/B_{OA}) / (LWL/BWL) / (BOA/BWL) |
| Sn+1 | BOA | [(L_{OA}/B_{OA}) / (L_{OA}/L_{WL})]^{0.5} |
| Sn+2 | BOA | (L_{OA}/B_{OA}) / B_{OA} |
| Sn+3 | BOA | BOA / (BOA/BWL) |
| Sn+4 | BOA | -2.2 \cdot 10^{-4} L_{WL}^2 + 0.057 L_{WL} + 5.5 |
| Sn+6 | V | \[L/(L/\sqrt[3]{\Delta})]\] |
| Sn+7 | \(\Delta\) | \(pV\) |
| Sn+8 | CB | 0.158 Fn + 0.302 |
| Sn+9 | T | V / (LWL × BWL × CB) |
| Sn+10 | D | T + 2.7 D_N + 2 |

Table 1.

2.2 CARS-PASSENGERS FERRIES (MONOHULL)

As for the passengers ferries, also for this kind of vessels a sample not enough sufficient for a correct statistics analysis has been analysed. The reference sample is compound from ferries whose significant dimensions are: L_{OA} = 71÷142 m, CN = 57÷425 and V = 30÷43 kn.

The whole sample is of 43 vessels but for every quantity has been considered reliable a smaller number of these (10÷ 13 vessels).

Cars-passengers fast ferries main dimensions are strongly influenced by cars number – CN - cars lines numbers – CLN - and by how many floors are in the garage. This parameter is quite dependent by the percentage of cars to stow in the main level - KC2 - and of cars specific area (i.e. KCI = Total Net Area of Garage / Cars Number).

Finally, for the first evaluation of the vessel characteristics, it is also necessary to assume the percentage of L_{WL} × BWL destined to the reference garage KC3.

The range of KC2 is from 0.4 to 1, it depends from the level numbers of the garage. For a layout on two levels, included values between 0.5 and 0.65 are conformed.
The KC3 value depends on the main engines exhaust arrangement and on the adopted layouts for vertical cargo shifts (cars ramps and passengers scale). The range of KC3 is from 0.70 to 0.85; it increases with the vessel dimensions.

The KC1 value influences strongly the whole procedure. If no indications are available, the following relation is suggested:

\[
KC1 = 1.6 \times 10^{-5} CN^2 - 0.015 CN + 13.4 \quad (6)
\]

The following relation can be utilized to determine the breadth of the garage BG:

\[
BG = 2.2 CLN + 0.5 \quad (7)
\]

From the garage dimensions, the first evaluations of the other form characteristics of the hull are estimable. In particular to the BG are linked the reference breadth \( B^* \) (including the reinforced frame) and the Bwl. Available data suggest the following relations:

\[
B^* = 1.06 BG \quad (8)
\]

\[
B_{WL} = 0.87 BOA \quad (9)
\]

It is to be noted that usually the bulwarks of fast ferries are very flared. Then it has been introduced \( B^* \), which is an intermediate value between the maximum breadth B and the \( B_{WL} \).

The correlation between the \( L_{WL} \) and the \( L_{OA} \) is shown in Figure 5, whose data permit to obtain the following relation:

\[
L_{OA} = -2 \times 10^{-3} L_{WL}^2 + 1.44 L_{WL} - 7 \quad (10)
\]

The relations to estimate \( C_B \) and \( L/V^{1/3} \) are also (3) and (4).

Finally we suggest the following relation to obtain the Depth D, calculated from the Baseline to the strength deck. In Figure 6 data and the linear regression are shown.

\[
D = 4.610^{-3} L_{OA} \times CNL + 6.9 \quad (11)
\]

The proposed procedure is usable for the first evaluation of the main dimensions and displacement. The critical aspect is the coherence between the values attributed to the initial parameters. Nevertheless, at the later stage of design, after the first layout of the garage, with a reliable definition of lifting installations and exhaust arrangements, the same procedure, based on the updated dimensions, become sensitively more reliable.
The other, rationally exactly, can be utilized when the basic design has been established and it could be developed in more details. It appears evident from the weights list that, in the first stage of the design process, poor information regarding the list of lightship weight are available, and so it must be subject to approximate treatment more of others parameters; starting from the lightship weight evaluation, the hull and superstructures weights appear to be subjected to more uncertainty.

Watson and Gilfillan (1977), considered the weight of the structures, which includes:

a) the weight of the basic hull to its depth amidships;

b) the weight of the superstructures (those full whose width is the extensions of the hull and that are above the basic depth amidships, e.g. a raised forecastle);

c) the weight of the deckhouses (those less than full width extensions on the hull and superstructure).

The subdivision is suitable to the commercial ships; because ships are composed of stiffened panel, the area Loa(B+D) has been taken as independent variable. Thus, Watson and Gilfillan proposed a modeling approach using the Equipment Number – E – with the hull, the superstructure and deckhouse elements contributions.

### 3.1 THE WATSON AND GILFILLAN METHOD
EXTENTS TO HIGH-SPEED FERRY

The more reliable methods to estimate the hull and superstructures weight seem to be:

- one of Karayannis at al. applicable to the monohulls and catamarans in aluminum alloy;
- one of Watson and Gilfillan (1977) applicable to the conventional ships in steel.

Both the methods are based on the choice of a single variable that must necessarily reflect the influence of the complete dimensions of the ship. Such variable is equal to:

\[ E_m = L_{oa} \left( B + T \right) + 0.85L_{oa} \left( D - T \right) \quad \text{monohull} \quad (12) \]

It is interesting to note that for the most only passengers ferries, due to their integrated shape nature and same materials (aluminum alloy), the total weight of the hull and superstructures may be considered as single weight. While for the most cars/passengers ferries, even if the hull and superstructures can be integrated, due to their different materials (the hull normally in high-steel –ERS 36- and the superstructures in aluminum alloy) a separation of weights should be considered.

Based on the above considerations, it is possible to develop a procedure only for high speed vessels, which permits to add data (to increase the suitability of the only known datum), considering the following assumptions:

1) it is supposed that the vessels (reference and derived) have similar hull weight distributions, then it is possible to write:

\[ \frac{w_s}{w_0} = \frac{W'S}{W'S}L_{oa} \]

\[ \frac{w_s}{w_0} = \frac{w_{s0}l}{w_{s0}l'} \]

where:

- \( W_S \) is the hull weight of the derived vessel;
- \( W'_S \) is the hull weight of the reference vessel;
- \( w_0 \) is the unitary hull weight of the midship section for the derived vessel;
- \( w'_0 \) is the unitary hull weight of the midship section for the reference vessel.

Loa, Loa’ are respectively the length over all of the reference and derived vessels.

2) it is supposed that the vessels (reference and derived) have similar superstructures weight distributions, then it is also possible to write:

\[ w_{s0} = \frac{w_{s0}l}{w_{s0}l'} \]

with:

- \( w_s \) is the superstructures weight of the derived vessel;
- \( w'_s \) is the superstructures weight of the reference vessel;
- \( w_{s0} \) is the unitary weight of the superstructures midship section for the derived vessel;
- \( w_{s0} \) is the unitary weight of the superstructures midship section for the reference vessel.

\( l, l' \) are respectively the maximum length of the reference and derived vessels superstructures (normally they are between 70 and 85 percent of the Loa).

It is possible now to evaluate \( w_0 \) by the following expressions:

\[ w_0 = \gamma_a A_s + \frac{W_T}{I} \quad \text{for only passengers vessels} \]

\[ w_0 = \gamma A_h + \frac{W_{Th}}{I} \quad \text{for cars/passengers vessels} \]

with:

- \( \gamma \) = steel density;
- \( A_s \) = hull cross section structural area;
- \( \gamma_a \) = aluminium alloy density;
- \( A_h \) = total cross section structural area;
\[ W_T = \text{frame weight (including hull and superstructures);} \]
\[ I = \text{frame interval respectively ordinary for transversal structural type (reinforced for longitudinal structural type).} \]
\[ W_{Th} = \text{frame hull weight.} \]

The value of \( w_{SU0} \) is:
\[ w_{SU0} = \gamma_a A_{as} + \frac{W_{Ts}}{I} \quad \text{(for cars/passengers high-speed vessels)} \tag{17} \]

with:
\[ A_{as} = \text{superstructure cross section structural area;} \]
\[ W_{Ts} = \text{frame superstructure weight.} \]

Note that to calculate the frame weights, all the discontinuous elements should be included with longitudinal regularity (i.e. floors, ribs, deck beams and brackets).

In this respect to increase the reliability data, starting from the well-known hull and superstructures weights, it is possible to add that ones obtained with the procedure based on the midship section dimensions.

### 3.1.2 EXAMPLES OF THE PROPOSED PROCEDURE

Numerical results for Hull weight estimate are shown in Table 3. In this regards, with the objective of increasing the data reliability, takes the well-known data of hull weight (see bold character in table 3), it is possible to add that ones obtained with a parametric procedure based on the midship sections dimensioning - which complies with the rules of classification Societies.

<table>
<thead>
<tr>
<th>( \Delta ) (t)</th>
<th>( \text{Loa \ [m]} )</th>
<th>( \text{Lbp \ [m]} )</th>
<th>( \text{B \ [m]} )</th>
<th>( \text{T \ [m]} )</th>
<th>( \text{D\ [m]} )</th>
<th>( \text{Em \ (m}^2\text{)} )</th>
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<tbody>
<tr>
<td>62</td>
<td>30.50</td>
<td>1.20</td>
<td>364.86</td>
<td>38</td>
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<td></td>
</tr>
<tr>
<td>105</td>
<td>41.90</td>
<td>1.36</td>
<td>556.85</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>118</td>
<td>43.00</td>
<td>1.36</td>
<td>477.34</td>
<td>61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>147</td>
<td>46.00</td>
<td>1.36</td>
<td>522.10</td>
<td>66</td>
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<tr>
<td>152</td>
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<td>81</td>
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</tr>
<tr>
<td>281</td>
<td>58.00</td>
<td>1.74</td>
<td>912.34</td>
<td>106</td>
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<tr>
<td>432</td>
<td>70.00</td>
<td>2.12</td>
<td>1207.15</td>
<td>156</td>
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</tr>
<tr>
<td>60</td>
<td>30.45</td>
<td>1.19</td>
<td>361.44</td>
<td>38.0</td>
<td></td>
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</tr>
</tbody>
</table>

Table 3

The results now obtained regard the hull weight of monohulls (hull and superstructures in aluminum) for passengers only high-speed vessels, and have been obtained considering the total weight of the hull and superstructures as single weight.

In table 4 samples of monohull ferries, whose basic ship lengths variants of 66.4 to 125.0m, have been shown. The monohulls considered have been based on the use of aluminum alloy for the superstructures and high steel for the hulls. Of these, the only actual available data of hull and superstructures weights regard the vessel of 99.30 m in length reported in bold.

\[ W = 2.056 \times 10^{-5} \cdot E_m^{0.2} + 0.10 \cdot E_m \quad R^2 = 0.9897 \tag{18} \]
\[ W = 0.053 \cdot E_m^{-1.12} \quad R^2 = 0.9881 \tag{19} \]

The regression results make available a starting point of the hull weight estimation for monohulls passenger only.

So the results until now obtained regard the hull weight of monohulls (hull and superstructures in aluminum) for passengers only high-speed vessels, and have been obtained considering the total weight of the hull and superstructures as single weight.

In table 4 samples of monohull ferries, whose basic ship lengths variants of 66.4 to 125.0m, have been shown. The monohulls considered have been based on the use of aluminum alloy for the superstructures and high steel for the hulls. Of these, the only actual available data of hull and superstructures weights regard the vessel of 99.30 m in length reported in bold.

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<tr>
<th>( \text{Loa \ [m]} )</th>
<th>( \text{Lbp \ [m]} )</th>
<th>( \text{B \ [m]} )</th>
<th>( \text{T \ [m]} )</th>
<th>( \text{D\ [m]} )</th>
<th>( \text{Em \ (m}^2\text{)} )</th>
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<tr>
<td>66.40</td>
<td>58.00</td>
<td>10.90</td>
<td>2.00</td>
<td>7.20</td>
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<tr>
<td>70.90</td>
<td>63.15</td>
<td>12.40</td>
<td>2.30</td>
<td>8.60</td>
<td>1421.90</td>
</tr>
<tr>
<td>96.20</td>
<td>84.00</td>
<td>14.60</td>
<td>2.10</td>
<td>10.00</td>
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<tr>
<td>101.80</td>
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<td>113.45</td>
<td>101.05</td>
<td>16.50</td>
<td>2.70</td>
<td>10.80</td>
<td>2959.34</td>
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<tr>
<td>125.00</td>
<td>110.00</td>
<td>18.70</td>
<td>2.44</td>
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<tr>
<td>99.30</td>
<td>83.90</td>
<td>13.90</td>
<td>2.24</td>
<td>9.50</td>
<td>2215.48</td>
</tr>
</tbody>
</table>

Table 4

Is to be noted that the monohull only passengers analysis has been carried out using basic ship lengths between 30 and 70 meters (range of Em between 300 and 1500 square meters), which are the most representative vessels of this category. The regression results furnish a first evaluation of the hull weight for only passenger monohulls.

The extension of the method, for the most cars/passengers ferries (referring to data of table 4), can be also obtained by midship dimensioning, applying U.N.I.T.A.S. Rules of Bureau Veritas, Registro Italiano Navale and Germanisher Lloyd. The method includes different materials (high steel for hull and aluminium alloy for superstructures). The results are shown in figure 8 and in the table 6, giving the following regressions formulae:
\[ W_S = -1.158 \times 10^{-3} \cdot E_m^2 + 0.20 \cdot E_m \quad R^2 = 0.9708 \quad (20) \]

\[ w_S = -6.281 \times 10^{-7} \cdot E_m^2 + 0.012 \cdot E_m \quad R^2 = 0.9325 \quad (21) \]

In the case of catamaran only passengers numerical results for hull weight estimation are shown in Table 3 where \( E_{cat} \) is:

\[ E_{cat} = L_o (b+\lambda) + 0.8 S_o (D-T) + 1.6 L_o (B - 2b) \]

with \( b \) = semihull beam.

In this regards, with the intention of increasing the reliability data, taken the well known data of hull weight (see bold character in table 6), it is possible to add the one obtained with the parametric procedure based on the midship sections dimensioning - which complies also with the rules of classification Societies.

\[ \Delta (t) \quad L_o [m] \quad l [m] \quad wo [t/m] \quad ws [t/m] \quad Em (m^2) \quad WS (t) \quad w_S (t) \quad Hull \quad Weight \quad (t) \]

<table>
<thead>
<tr>
<th>( \Delta (t) )</th>
<th>( L_o )</th>
<th>( l )</th>
<th>( wo )</th>
<th>( ws )</th>
<th>( Em )</th>
<th>( WS )</th>
<th>( w_S )</th>
<th>( Hull )</th>
<th>( Weight )</th>
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<td>15.5</td>
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<td>93.7</td>
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<td>580.8</td>
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<td>0.96</td>
<td>2215.5</td>
<td>406.8</td>
<td>26.6</td>
<td>433.53</td>
<td>433.53</td>
</tr>
</tbody>
</table>

Table 5.

It is interesting also to note that the monohull car/passenger analysis has been carried out using basic ship lengths between 65 and 125 meters (range of \( Em \) between 1000 and 4000 square meters), which are the most representative vessels of this category.

Figure 8

It is to be pointed out that at the early stage of the design, the estimation of the hull weight typically involves the use of models, which are developed from weight information for similar vessels. At this state, the designer does not know the longitudinal distribution of the hull and superstructures weights, but he had to estimate the main dimensions of vessel (and then \( Em \)). The developed method is derived mainly from the utilization of the relations (13) and (15) (which are based on the hypothesis that reference and derived vessels have similar hull weight distributions). On the contrary the designer can utilize the (20) and/or (21) relations, where the only parameter \( Em \) is required.

\[ \Delta (t) \quad L_o \quad \omega_0 \quad \omega_s \quad E_{cat} (m^2) \quad W_S (t) \quad w_S (t) \quad Hull \quad Weight \quad (t) \]

<table>
<thead>
<tr>
<th>( \Delta (t) )</th>
<th>( L_o ) [m]</th>
<th>( \omega_0 ) [t/m]</th>
<th>( \omega_s ) [t/m]</th>
<th>( E_{cat} ) [m^2]</th>
<th>( W_S ) [t]</th>
<th>( w_S ) [t]</th>
<th>Hull Weight [t]</th>
</tr>
</thead>
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<td>29.0</td>
<td>0.95</td>
<td>274.18</td>
<td>25.95</td>
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<td>550.10</td>
<td>51.46</td>
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</tr>
</tbody>
</table>

Table 6

The figure 9 shows the results of table 6.

Figure 9

The results till now obtained regard the hull weight of catamarans (hull and superstructures in aluminum) for only passengers high-speed vessels, and have been ob-
tained by the (13) and (15) equations, where midship dimensioning has been obtained applying U.N.I.T.A.S. Rules of Bureau Veritas, Registro Italiano Navale and Germanischer Lloyd. It is interesting also to note that the catamarans only passengers analysis has been carried out using basic ship length between 20 and 60 meters (range of Ecat between 150 and 1500 square meters), which are the most representative vessels of this category.

The regression formulae can be proposed:

\[
W_s = 2.05 \times 10^{-6} \times E_{cat} \times 2 + 0.087 \times E_{cat} \quad R^2 = 0.995
\]

\[
W_s = 0.039 \times E_{cat}^{1.12} \quad R^2 = 0.985
\]

4. CONCLUSIONS

Some principles for determining the displacement and a set of main dimensions, which can be used as starting values for the design of high-speed fast ferries monohull, have been presented.

Moreover, the exposed methodologies are suitable, with more reliability, to evaluate the variational sensitivity of the strategic dimensions in the design of vessels, whose typology is quite known (i.e. are reliable and coherent KP1, KC1, etc.).

An extension of the hull weight regression for only passengers and cars/passengers monohulls, based on a parametric procedure with vessels having similar hull weight distribution, has been carried out.

The hull weight regression has been obtained also for catamarans only passengers in aluminum, considering the weight of hull and superstructures as single weight.

The methodologies and algorithms developed make available further developments and refinements, including the most representative cars/passengers high-speed vessels catamarans, whose mains objectives will be aim of successive researches.

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REFERENCES

