

**Examples with « Gene-Stab Sailboat 3.5 »**

*Jean-François Masset – February 2026*

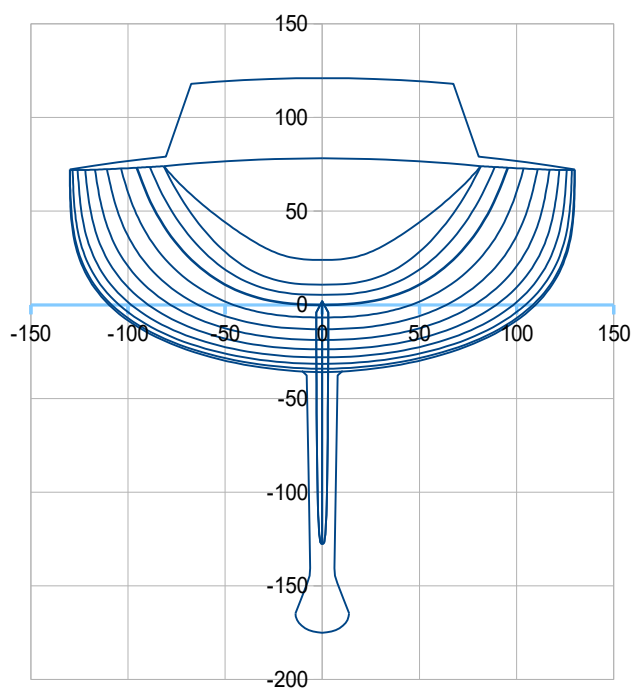
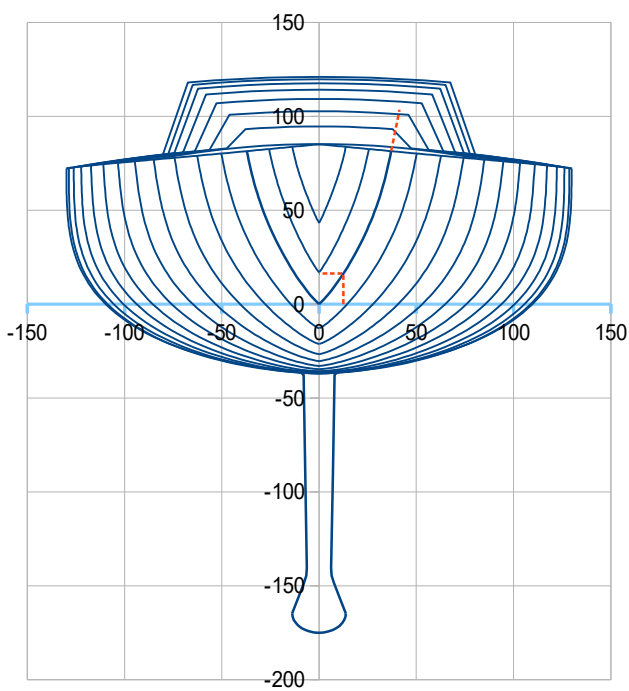
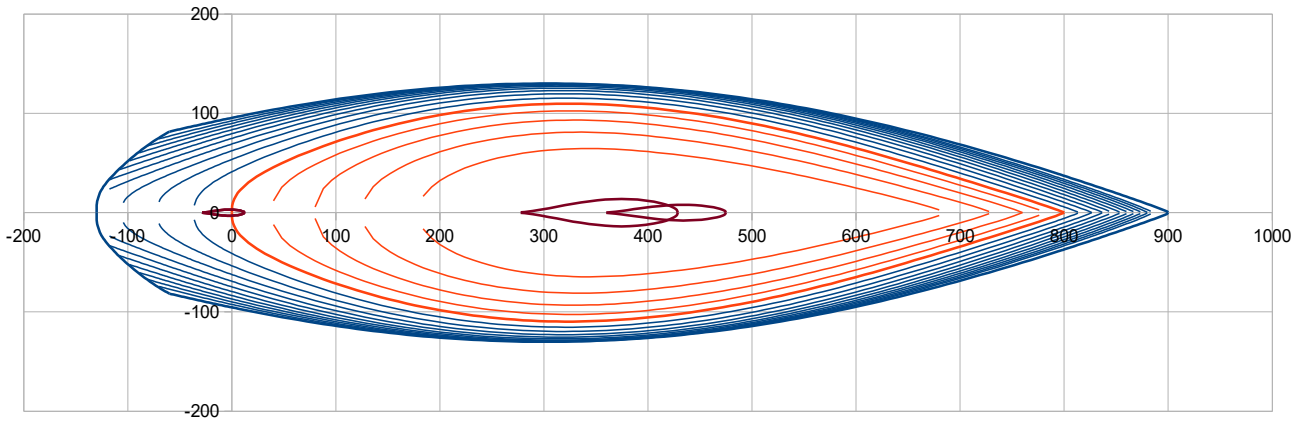
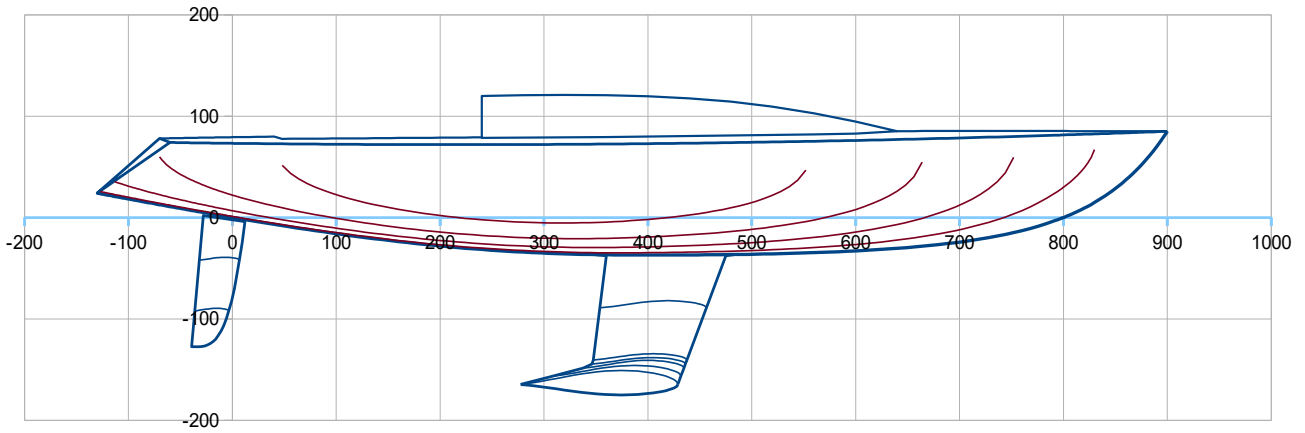
[jfcmasset@outlook.fr](mailto:jfcmasset@outlook.fr)

« Gene-Stab Sailboat 3.5 » spreadsheet application is here illustrated through 3 examples :

- **V1 modern classic sailboat** (the reference boat in « Gene-Hull Sailboat 3.5 »)
- **Dolfi 32S**, inspired by Beneteau Figaro III / VPLP
- **DH17**, inspired by the Dark harbour 17,5 / B.B. Crownwinshield

## Boat V1 modern classic daysailer

Loa 10,30 m ; Lwl 8,00 m ; B 2,60 m ; Draft 1,75 m ; Light weight : 2673 kg ; Keel-bulb 1090 kg



**Sailplan**  
Main (m2)  
23,06

Jib (m2)  
24,04

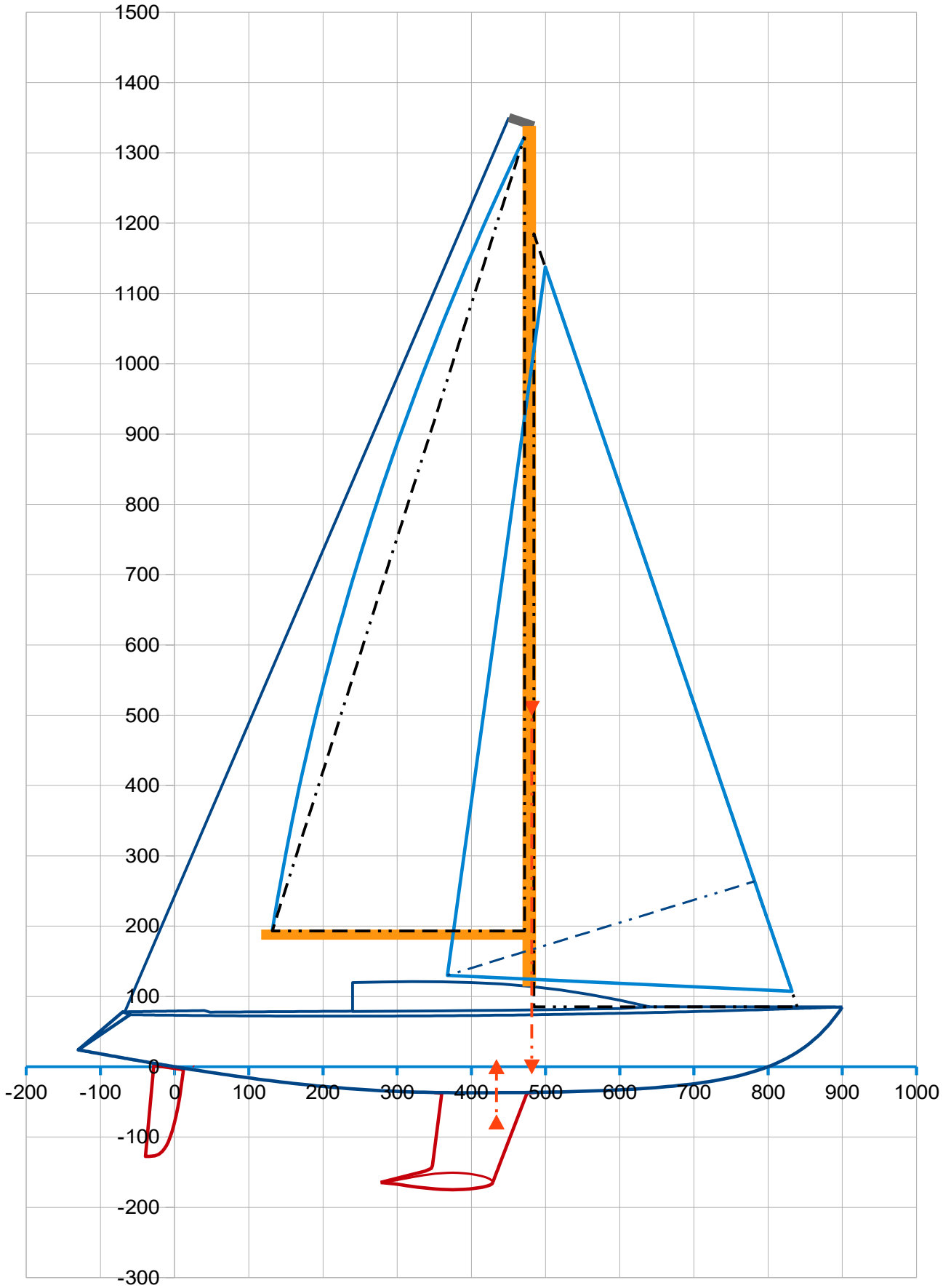
ZCE (m)  
5,26

Zdeck (m)  
0,85

Zmast (m)  
13,23

Spi (m2)  
70,00

ZCE spi (m)  
6,31  
sym0 asym1  
0



**Boat V1 / Introduction of a load and its position Xg, Zg, Yg :**

In Gene Stab, for the computation of the GZ curve up to 180°, it is recommended to put **Yg = 0** for both « Crew at center » and « Crew sit windward », as done here below.

(In Gene-Hull at contrary, for the knowledge of the righting moment RM in sailing conditions with heel < 30°, it is recommended to put an Yg representative of the crew sit windward).

**Mass spreadsheet with input of a load**

Data to enter : yellow cells	Mass (kg)	Xg (m)	Zg (m)	Yg (m)	(in the coordinates of the 2D)
Boat light weight (kg)	2672,61	3,782	-0,078	0	from the mass spreadsheet
<b>Load (kg)</b>	<b>300,00</b>	<b>2,00</b>	<b>0,85</b>	<b>0,00</b>	Crew at center
			<b>0,85</b>	<b>0,00</b>	Crew sit windward
<b>Total &gt;&gt;&gt; Mass (kg)</b>	<b>2972,61</b>	<b>3,602</b>	<b>0,015</b>	<b>0,000</b>	<b>Crew at center</b>
<b>Disp. (m3)</b>	<b>2,90011</b>		<b>0,015</b>	<b>0,000</b>	<b>Crew sit windward</b>

**Computation of the GZ with a flush deck :** for a first conservative approach of the GZ curve up to heel 180°, one can assume that the volume of the cabin roof and the recess of the cockpit roughly compensate, and that the computation with a flush deck is significant enough for an early stage project (we show the cabin volume influence in the STIX chapter here after).

>>> To input Kroof (%B) = 0 (Cell B53)

<b>Kroof (%B)</b>	<b>0,0</b>
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That said, just to see the influence of a cabin roof volume at high heel angles beyond 90°, you can do also the computation with the Kroof of the project, here with Kroof = 29.

**Typical process to build the GZ curve up to 180° with a step of 5° :** the User enter an heel angle (0, 5, 10, etc ...) and recopy/special paste the line of results giving heel, trim and Gz in the GZ table. Example :

**Input an heel angle, example here 20 :**

Data to enter : yellow cell		Results			
Heel (°)	20	Disp. (m3)	2,90012	/ Disp. (m3)	2,90011
> Height (cm)	3,2962	Xc heel (m)	3,602	/ Xg (m)	3,602
> Trim (°)	0,166	Yc heel (m)	-0,328	Yg heel (m)	-0,005
		Zc heel (m)	-0,195	> GZ (m)	0,323
		Sw heel(m2)	17,53	RM (kN.m)	9,414
		Bwl heel (m)	2,04	FB mini (cm)	26,2
		LCB – LCF (%Lwl)	0,80	Obliquity (°)	2,7
Check % convergence					
	0,00	:	Disp		
	0,00	:	X	Kvol. :	1,000

**The computation of the equilibrium is quasi real time** (about 0,5 seconde on my PC) :

The convergence accuracy is given, here 0,00 % of the deviations for both the Displacements and the longitudinal Xs.

Kvol is the ratio of keel volume in the water, also computed taken into account the keel attitude within the equilibrium with heel angle. Here Kvol 1, meaning the keel stays fully immersed.


**On the right side, the 3 values for Heel , Trim and GZ are automatically recopied :**

Heel (°)	Trim (°)	GZ (m)	Recopy of the equilibrium data
20,00	0,166	0,323	<<< to copy-special paste (Number, Format) in GZ table

**>>> User has to copy/special paste (number, format) these 3 values in the table here under :**

**GZ data storage (by copy/special paste)**

Heel (°)	Trim (°)	GZ (m)
0,00	0,520	0,000
5,00	0,497	0,090
10,00	0,430	0,176
15,00	0,320	0,254
20,00	0,166	0,323



Once the complete process is done from 0° to 180° step 5°, that leads to this table (here in the following page).

As the height of the center of gravity, i.e. the Zg value in the table head of previous page (here 0,015 m) can be uncertain at this stage of the project, it is possible to see the consequence of another Zg, for example a higher value less favorable for the stability (here 0,100 m) : just to input this another Zg and the GZ values are automatically re computed (the second GZ column of the table in the following page) :

..... / .....

**GZ data storage (by copy/special paste)****With another Zg****0,100** < to input

Heel (°)	Trim (°)	GZ (m)	GZ (m)
0,00	0,520	0,000	0,000
5,00	0,497	0,090	0,083
10,00	0,430	0,176	0,161
15,00	0,320	0,254	0,232
20,00	0,166	0,323	0,294
25,00	-0,029	0,382	0,346
30,00	-0,261	0,433	0,390
35,00	-0,521	0,476	0,427
40,00	-0,789	0,509	0,454
45,00	-1,052	0,528	0,468
50,00	-1,301	0,536	0,471
55,00	-1,516	0,533	0,464
60,00	-1,692	0,522	0,449
65,00	-1,833	0,509	0,432
70,00	-1,928	0,505	0,426
75,00	-2,006	0,501	0,419
80,00	-2,071	0,463	0,380
85,00	-2,100	0,416	0,332
90,00	-2,101	0,364	0,279
95,00	-2,080	0,308	0,224
100,00	-2,031	0,250	0,167
105,00	-1,958	0,190	0,109
110,00	-1,860	0,129	0,049
115,00	-1,739	0,067	-0,009
120,00	-1,596	0,006	-0,067
125,00	-1,436	-0,054	-0,123
130,00	-1,255	-0,111	-0,176
135,00	-1,064	-0,166	-0,225
140,00	-0,863	-0,215	-0,269
145,00	-0,656	-0,258	-0,307
150,00	-0,448	-0,293	-0,335
155,00	-0,244	-0,317	-0,353
160,00	-0,058	-0,326	-0,355
165,00	0,103	-0,312	-0,334
170,00	0,218	-0,264	-0,278
175,00	0,258	-0,158	-0,165
180,00	0,255	0,000	0,000

**AVS (°)****120,51****Areas ratio****3,43****AVS (°)****114,20****Areas ratio****2,37**

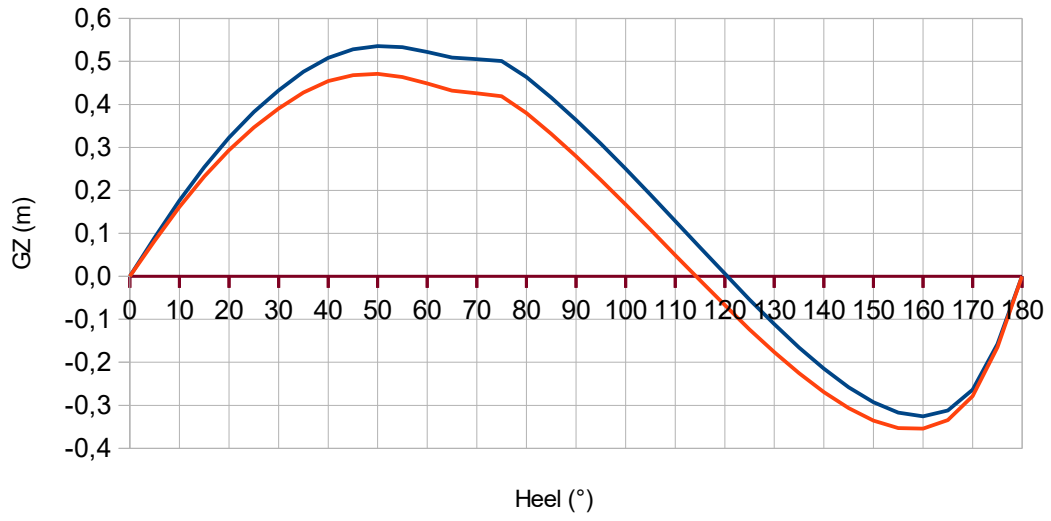
The angle of vanishing stability (AVS) is output : here respectively 120,5° (with Zg 0,015 m the initial value ) and 114,2° (with another Zg 0,100 m as input).

The Areas ratio (positive area / negative area under the Gz curve) are also given, representative of the stability in upside down configuration : the higher the ratio, the better the unstability in upside down configuration, which is the objective we want. In particular, it is a criteria relevant when sailing in open ocean conditions far from a shelter (typically the roaring south seas), e.g. it is adopted in the Imoca class rules with this condition : areas ratio > 5.

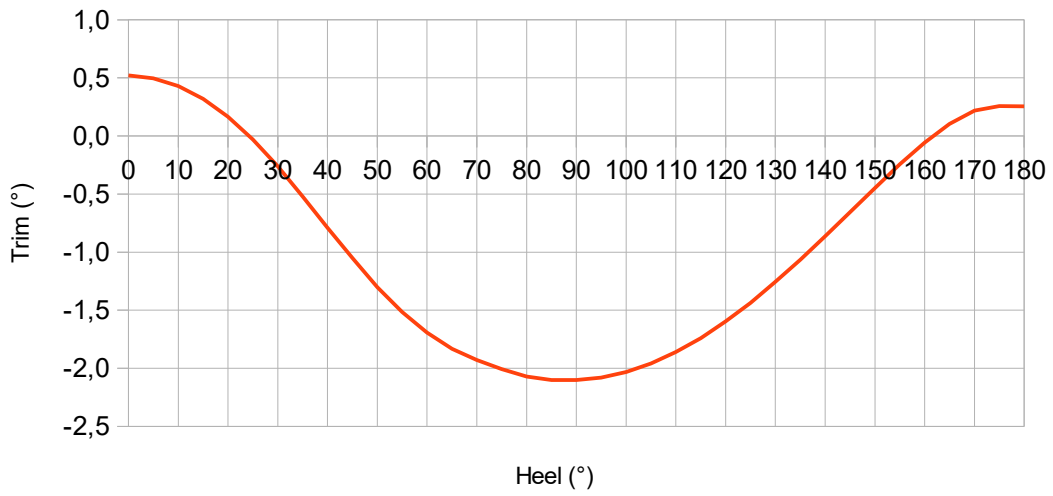
The corresponding GZ curves and the Trim curve are also output :

## GZ curve

Blue : with initial  $Z_g$  ; Red : with another  $Z_g$

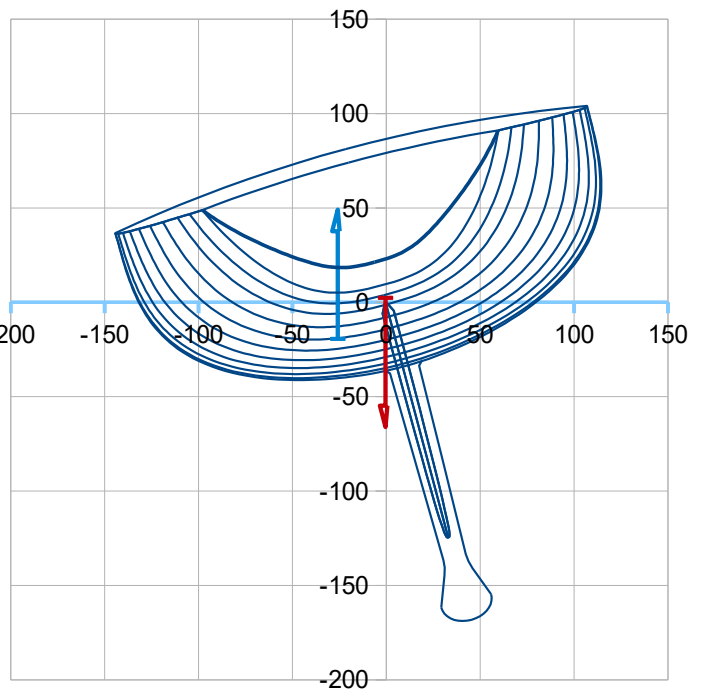
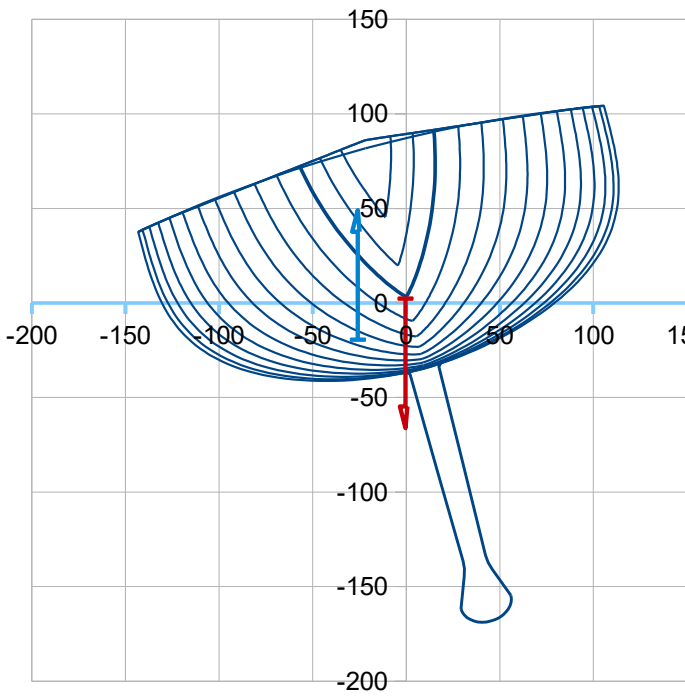


## Trim (computed in the fixed vertical plan)

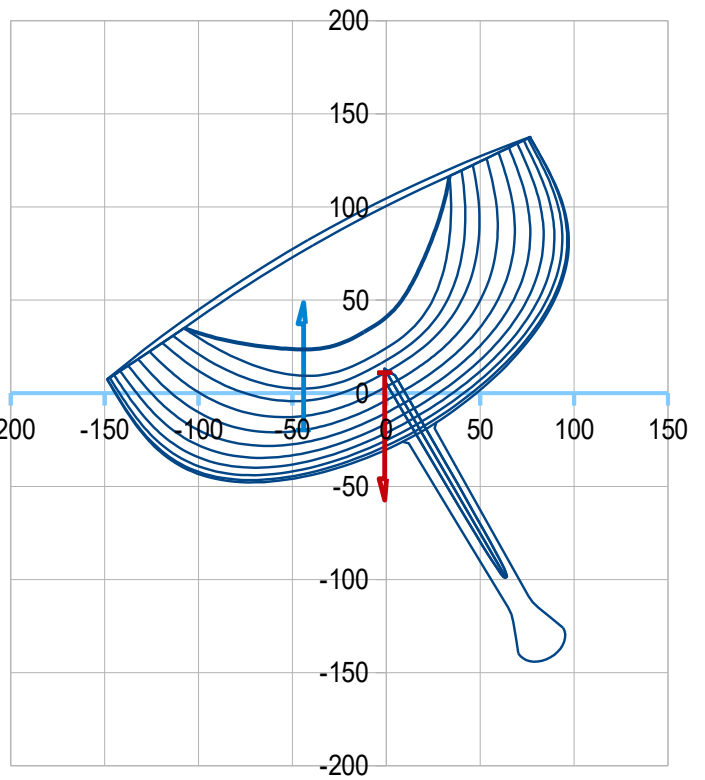
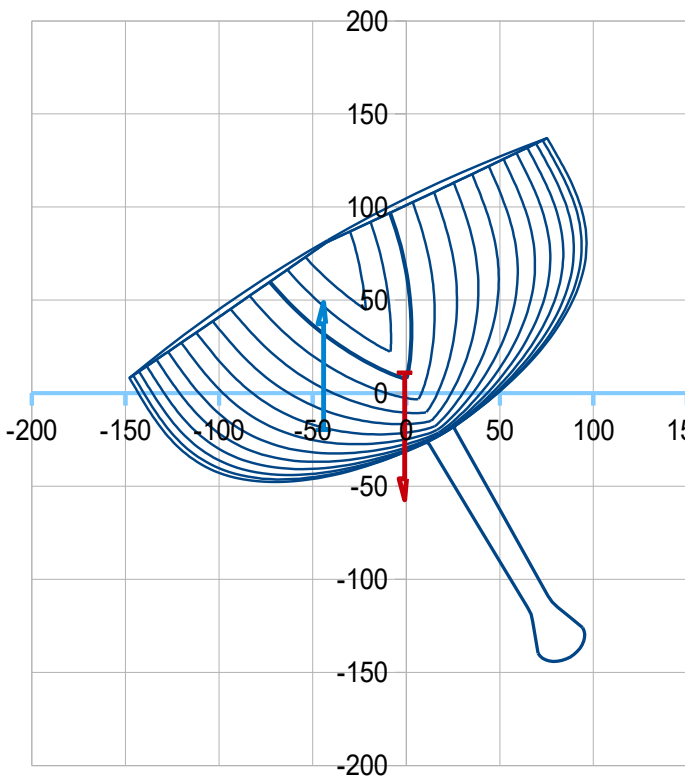


**Boat V1 / Some typical heeling configurations :**

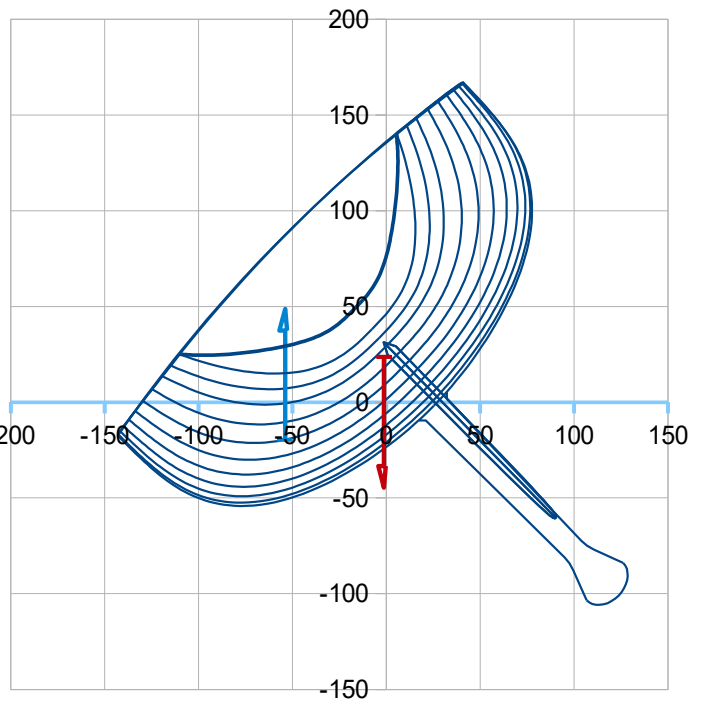
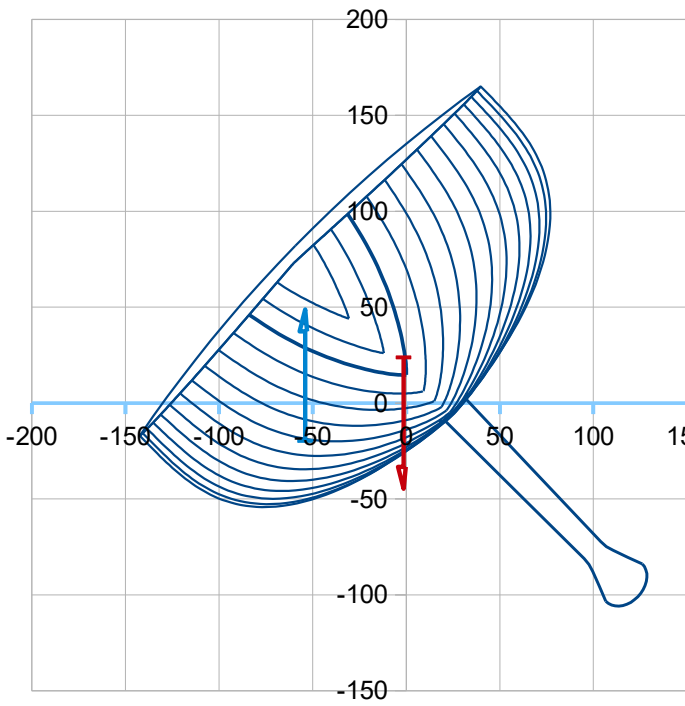
**At heel 15° >>> GZ = 0,254 m**



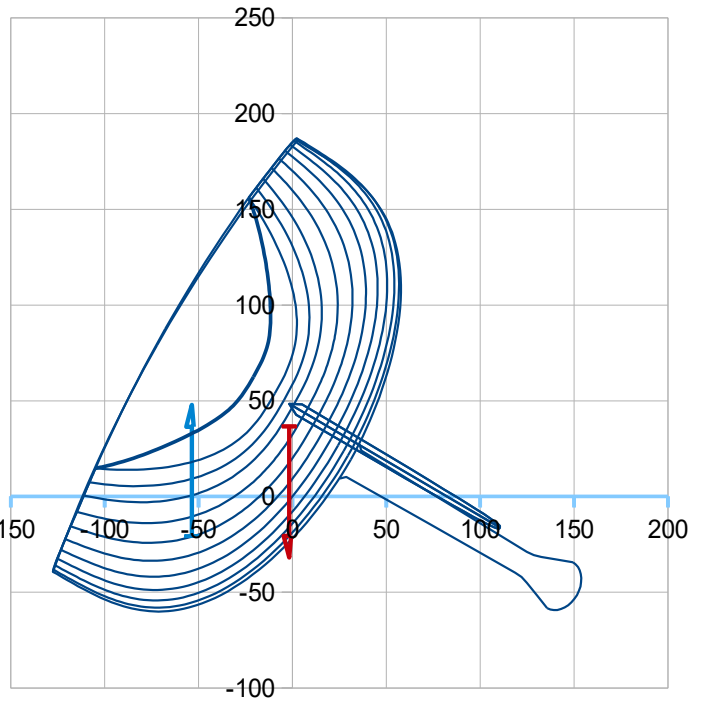
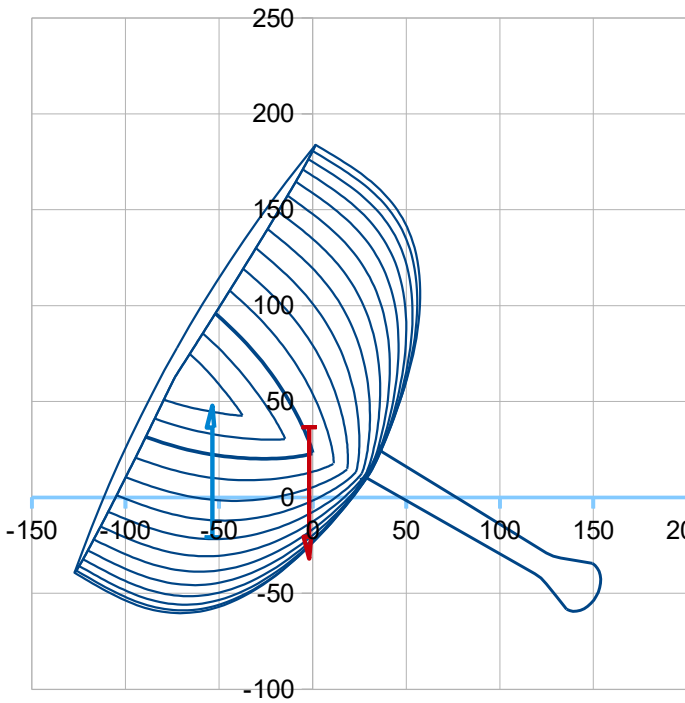
**At heel 30° >>> GZ = 0,433 m**



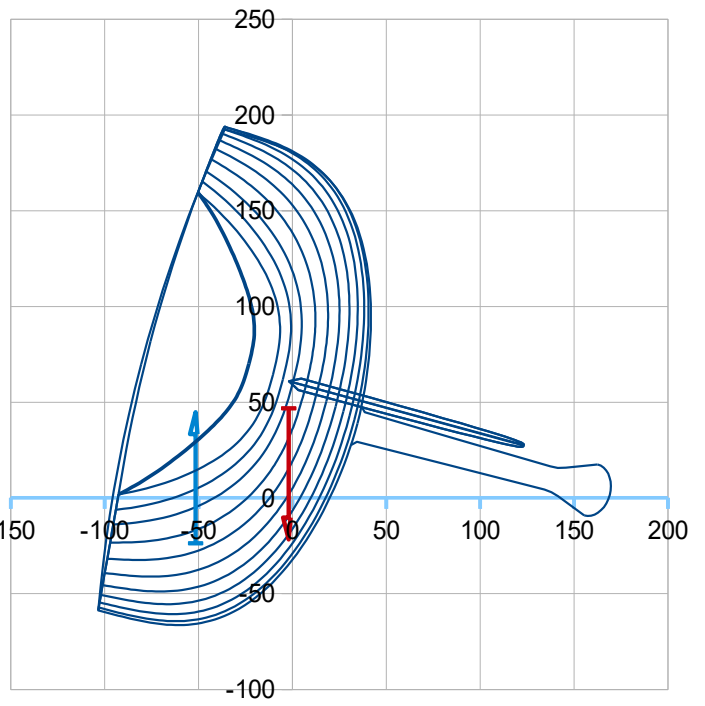
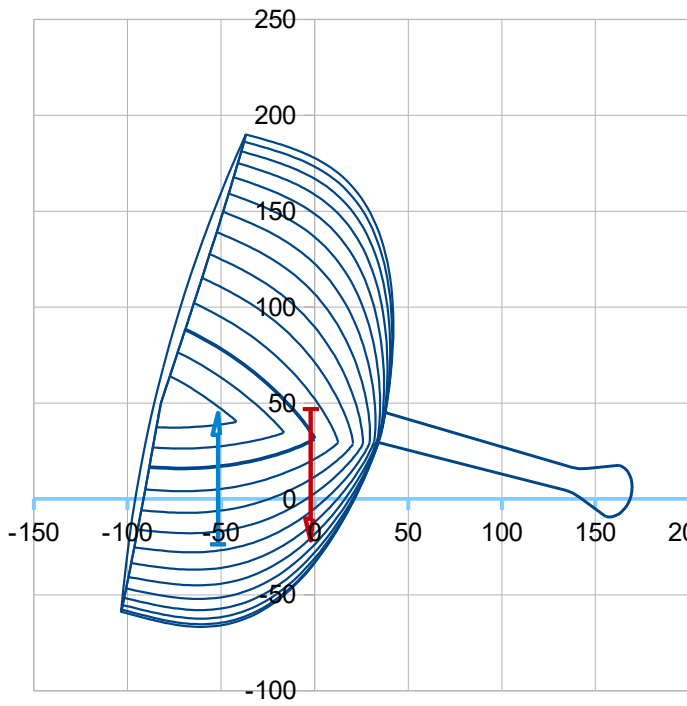
At heel 45° >>> GZ = 0,528 m



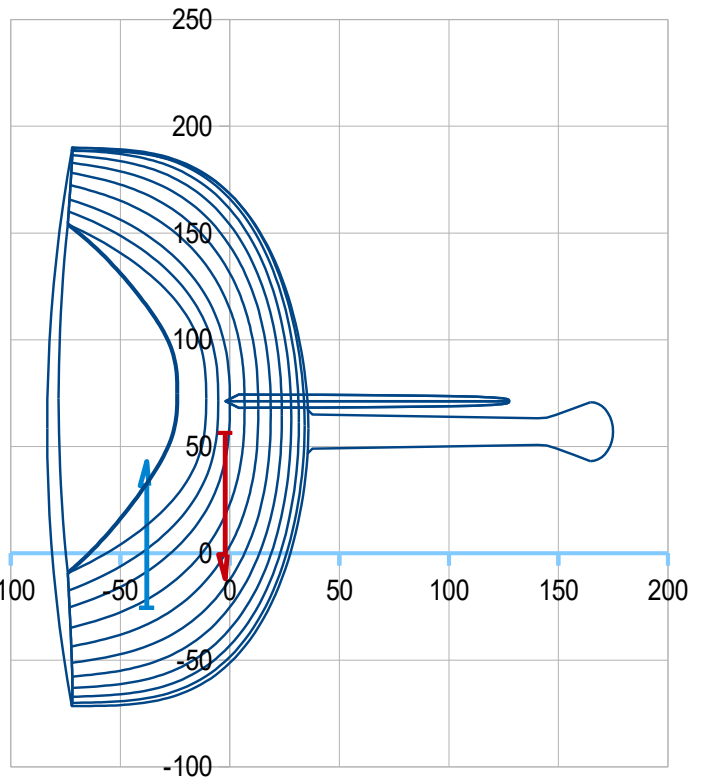
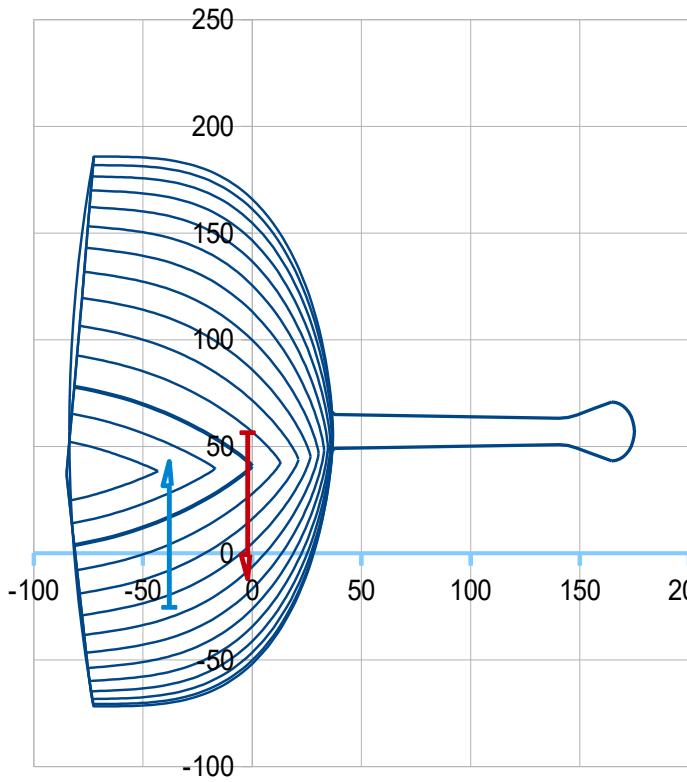
At heel 60° >>> GZ = 0,522 m



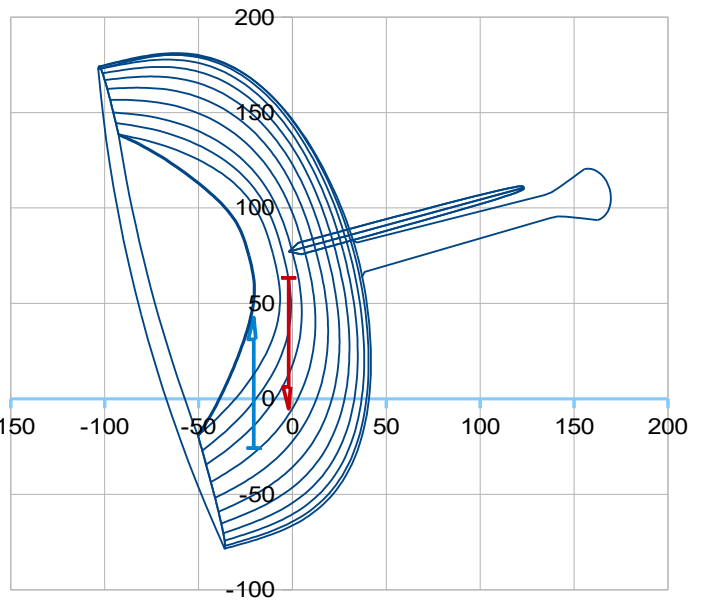
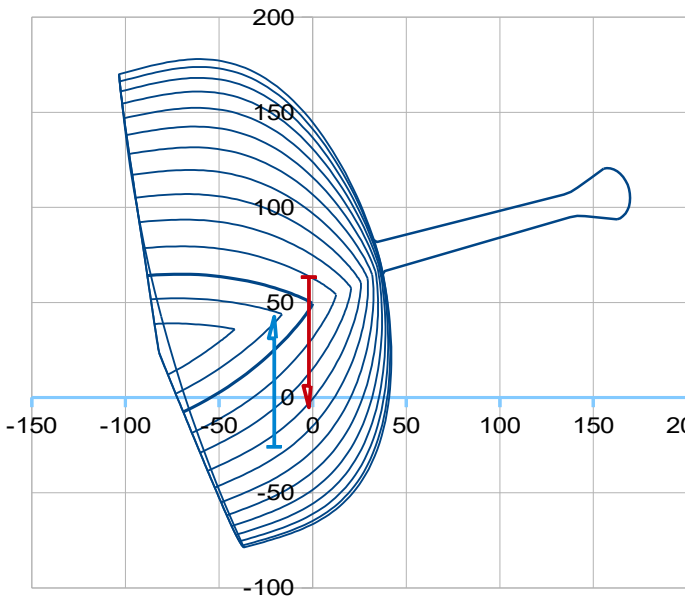
At heel 75° >>> GZ = 0,501 m



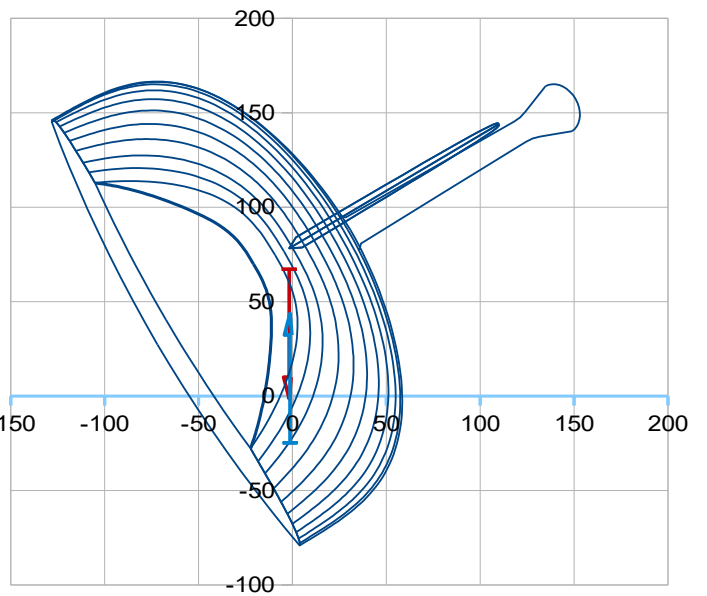
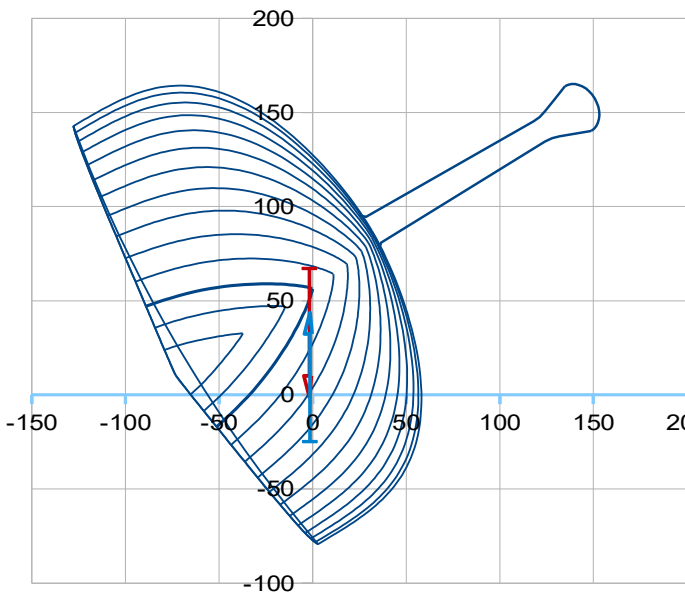
At heel 90° >>> GZ = 0,364 m



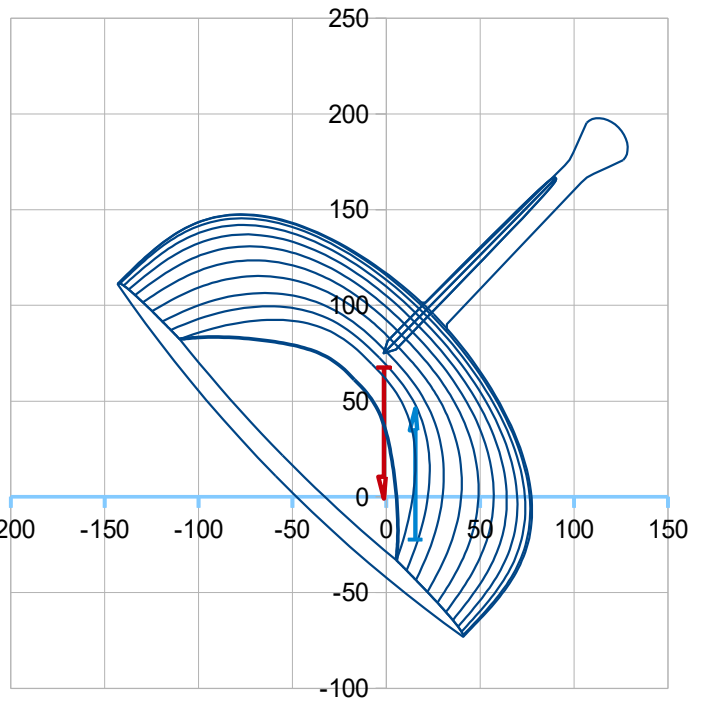
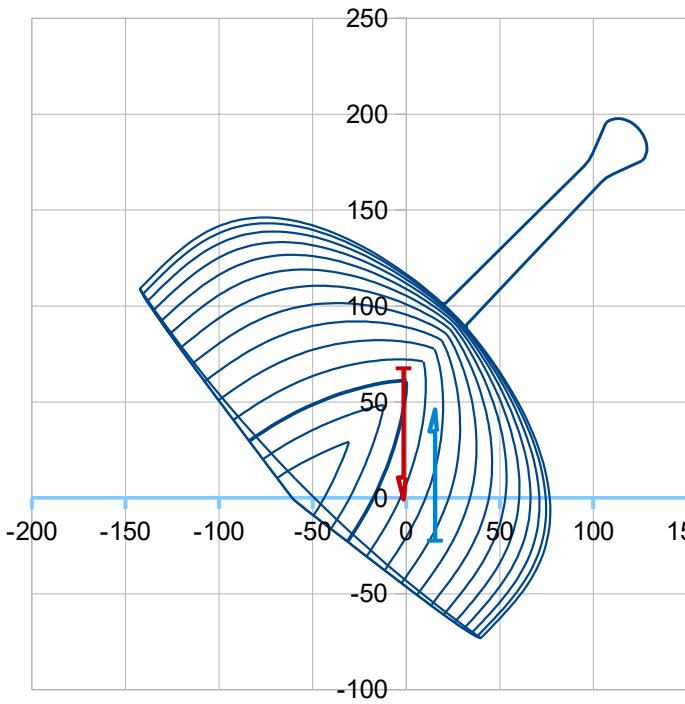
At heel =  $105^\circ$  >>>  $GZ = 0,190$  m



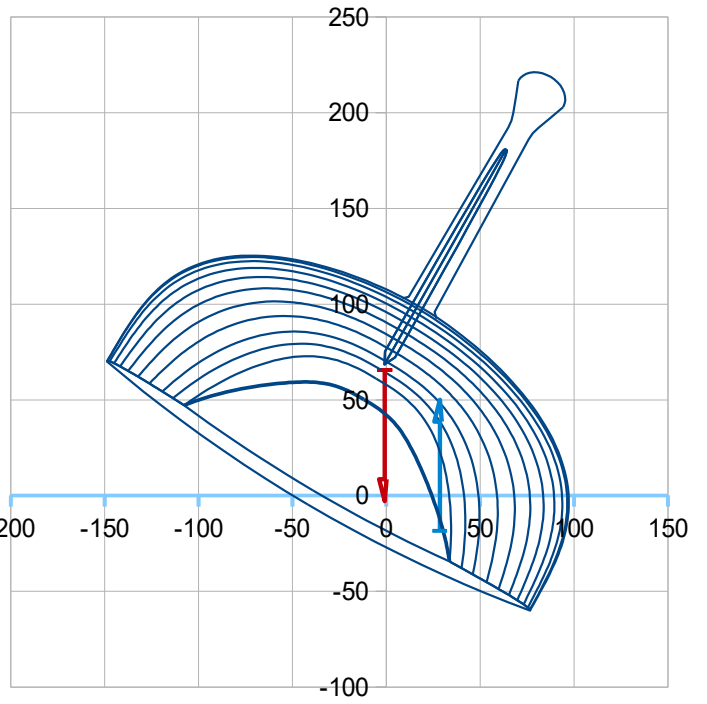
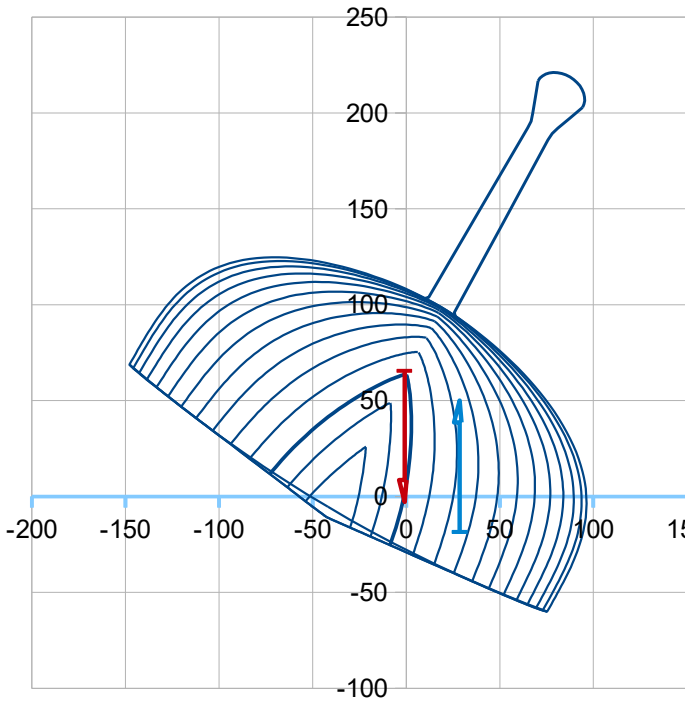
At heel  $120,52^\circ$  >>>  $GZ = 0,000$  m Angle of Vanishing Stability



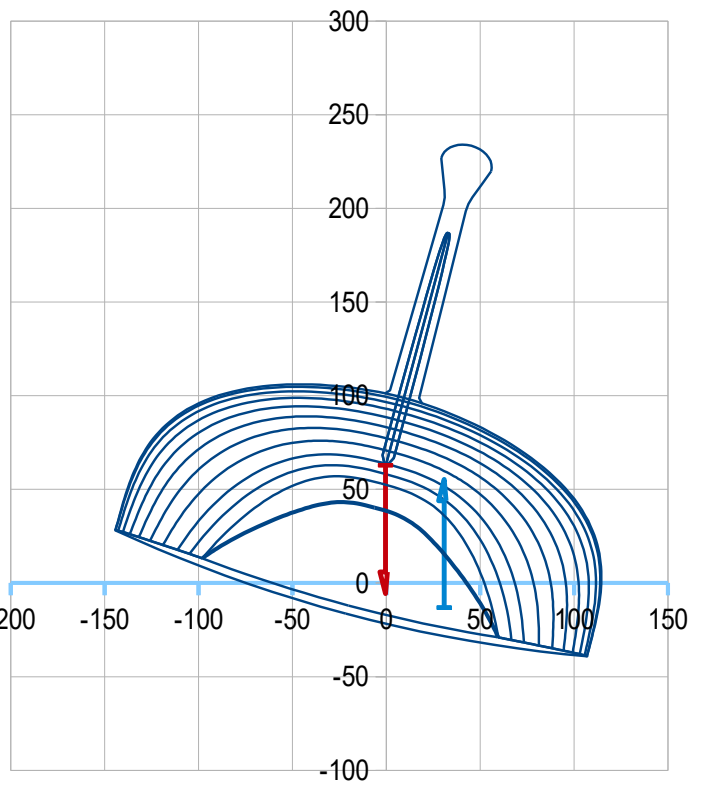
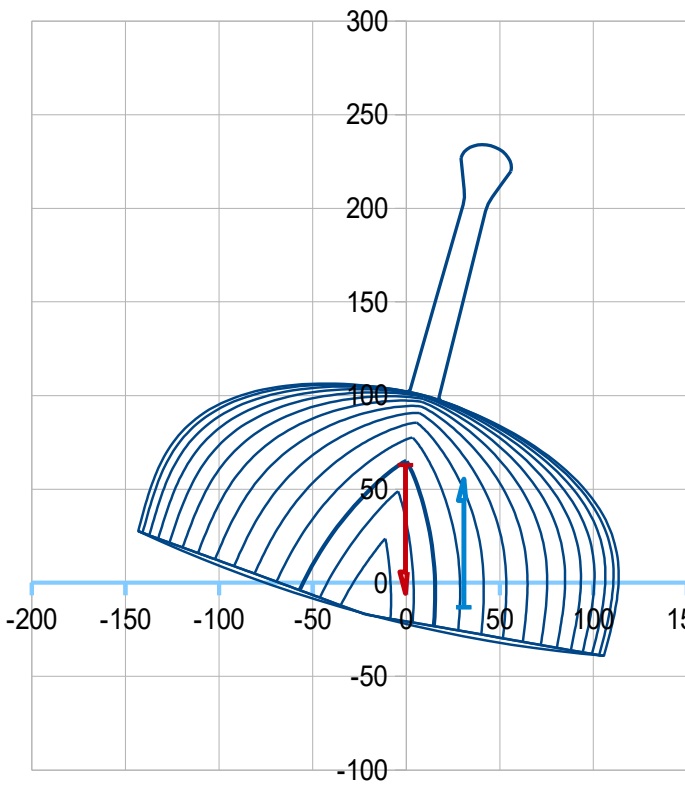
At heel 135° >>> GZ = - 0,166 m



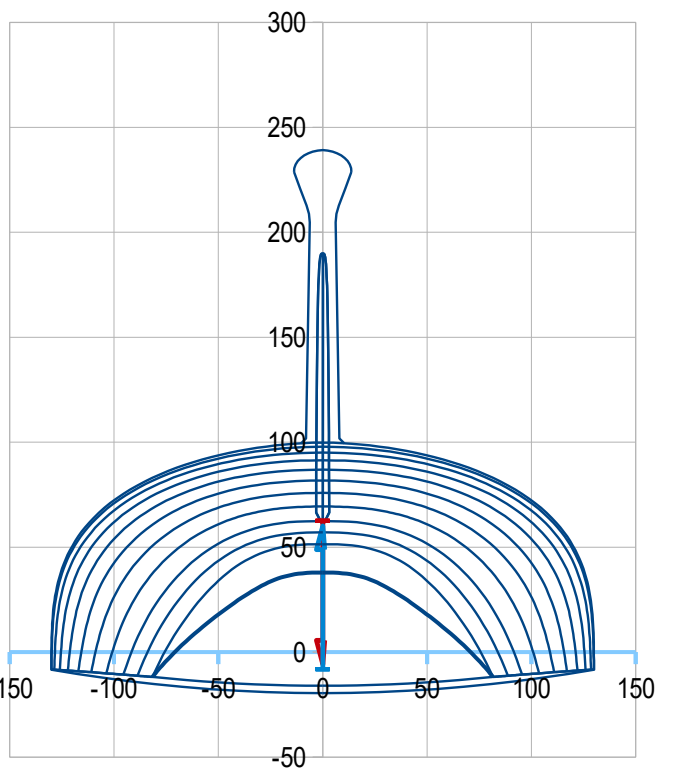
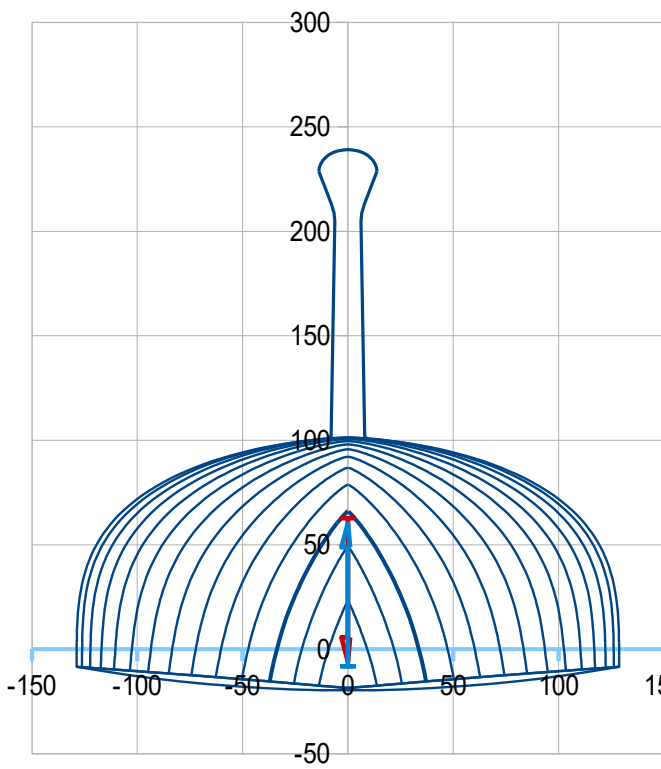
At heel 150° >>> GZ = - 0,293



At heel = 165° >>> GZ = - 0,312 m



At heel 180° >>> GZ = 0,000 m



## Boat V1 / STIX

The sheet « STIX » proposes the computation of the Stability Index STIX according to ISO 12217-2 2013. For this purpose, 3 complementary input data are necessary, the others data being provided automatically by the Stab application :

**As (sails area), hCE (height of center of effort) :** these data can be taken in the sheet Sailplan of « Gene-Hull Sailboat 3,2 » (here for the boat V1 : As 47,1 m<sup>2</sup> and hCE = 5,26 m)

**PhiD(°) the angle of first downflooding :** the norm ISO consider various downflooding angles in the formulations leading to the STIX. Here to simplify and to be conservative for an early stage approach, we consider only one angle PhiD assumed to correspond to e.g. the first downflooding of the companionway top corner (**here let's take a conservative 95°**).

+

to put Heel = 0 in the Stab sheet in order to have all the data available in this STIX sheet.

## STIX spreadsheet application

### STIX according to ISO 12217-2 2013 for Sailboat of Length > 6 m

#### Input data (in yellow cells the necessary input, in blue the data coming from Stab)

<b>Hull length</b> excluded bolted on extensions (bowsprit, stem roller, etc...)	LH (m)	10,300	
<b>Hull width</b> excluded bolted on extensions (cab rails, rub rails, etc ...)	BH (m)	2,600	
<b>Displacement</b> (ISO consider either mMO Minimum Operating condition or mLA Loaded Arrival condition)	m (kg)	2973	
<b>Length waterplane</b> (to put heel = 0 in Stab)	Lwl (m)	8,258	
<b>Beam waterplane</b> (to put heel = 0 in Stab)	Bwl (m)	2,246	
<b>Sail area</b> (Mainsail + fore triangle)	As (m <sup>2</sup> )	47,1	<<< to input
<b>Height of sail area centroid</b> (/H0)	hCE (m)	5,26	<<< to input
<b>Height of center (m) of lateral area</b> below the waterline when the boat is upright (/H0)	hLP (m)	0,587	
<b>Height of waterline in loading condition</b> (to put heel = 0 in Stab)	(m)	0,022	

#### Data coming from the GZ Curve :

		With Zg (m)	With Zg (m)	
<b>Righting arm at 90°</b>	GZ90° (m)	0,364	0,279	
<b>First occurring downflooding angle</b>	PhiD (deg)	95	95	<<< to input
<b>&gt;&gt; Righting arm at downflooding angle</b> (Computed in Stab)	GZD (m)	0,308	0,224	
<b>Angle of vanishing stability</b>	AVS (deg)	120,5	114,2	
<b>Area under the GZ curve up to AVS</b>	AGZ (m.deg)	42,338	35,167	

#### Computation of the STIX parameters

	LBS (m)	8,939	8,939
	FL	0,959	0,959
(0,75 – 1,25)	FDL	0,911	0,911
	FB	1,921	1,921
(0,75 – 1,25)	FBD	1,039	1,039
	FR	2,192	1,683
(0,5 – 1,5)	FKR	1,058	1,015
(0,4 – 1,5)	FIR	0,979	0,927
(0,5 – 1,0)	FWM	1,000	1,000
(0,5 – 1,5)	FDS	0,947	0,896
(0,5 – 1,25)	FDF	1,056	1,056

>> STIX 26,8 24,9

>> AVS (°) 120,5 114,2

>>Righting Energy (m.deg.kg) 125 855 104 537

Areas ratio 3,4 2,4

The output is given both for the initial Zg (here 0,015 m) and for the « another » Zg (here 0,100 m) from the input in the Stab sheet.

The result shows that with initial Zg = 0,015 m, the classification in Cat. B is possible :

- the STIX = 26,8 is > 23 minimum for cat. B
- The AVS = 120,5° is > 115,3° minimum for cat. B
- The Righting energy = 125 953 m.deg.kg is > 57 000 minimum for cat. B

To compare with :

Design category	Cat. A	Cat. B	Cat. C	Cat. D
STIX Lower limit	32	23,0	14,0	5
AVS (°) mini required	124,1	115,3	90,0	75
Righting energy (m.deg.kg) mini required	172 000	57 000		

One can not that with the higher Zg 0,100 m , the AVS drops to 114,2° < 115,3° , the classification in Cat. B is no longer possible. This highlights on the necessity to keep the weights low enough.

One can also highlight the influence of PhiD (first occurring downflooding angle), e.g. ± 5° / 95° :

with input PhiD = 90° >>> STIX = 26,1  
 with input PhiD = 95° >>> STIX = 26,8  
 with input PhiD = 100° >>> STIX = 27,5  
 >>> this does not change for the classification in Cat. B.

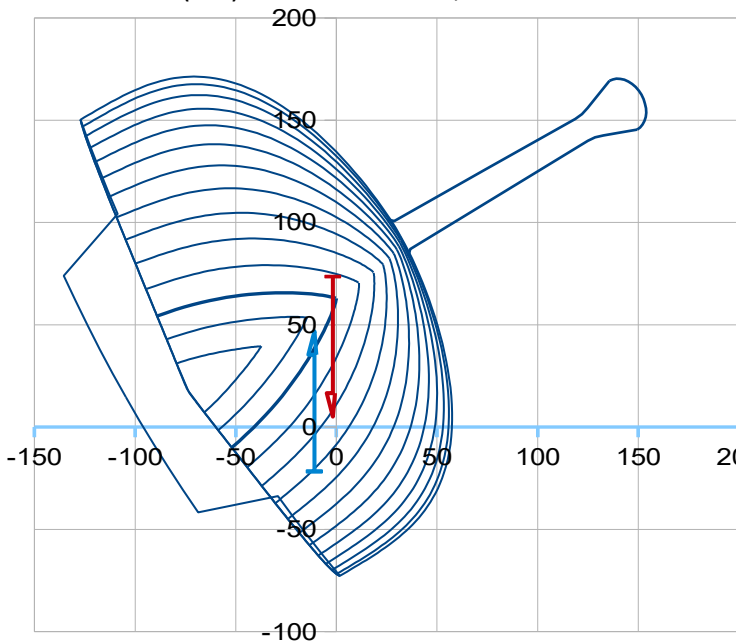
The Areas ratio, already computed in the Stab sheet, is here just recopied.

**Boat V1 / influence of an the extra volume provided by the cabin roof assumed waterproof.**

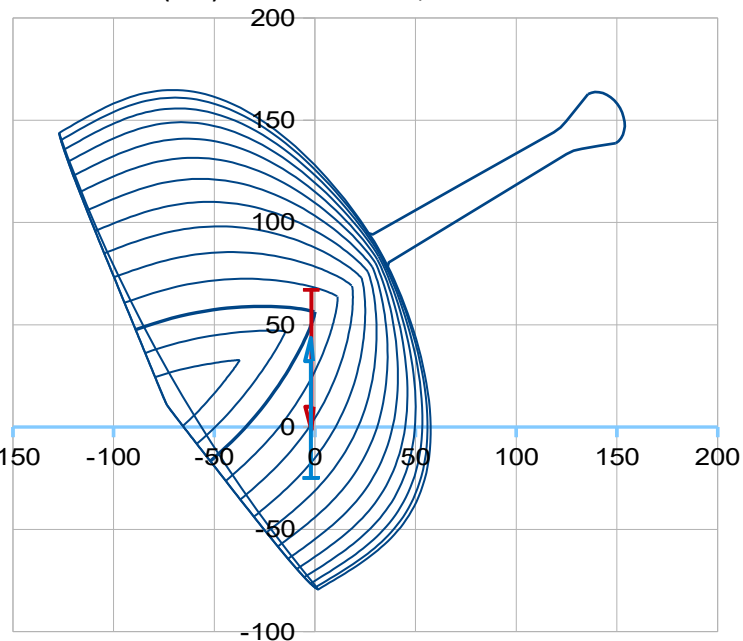
Done with putting Kroof (%B)=29 (in cell B53), i.e. the value which corresponds to the roof as drawn in pages 2 and 3 >>> the extra volume, assumed watertight, starts its influence at heel angles around 90° usually, i.e. concerns the AVS issue.

**Example at 120° :**

Kroof (%B) = 29 >>> GZ = 0,096 m

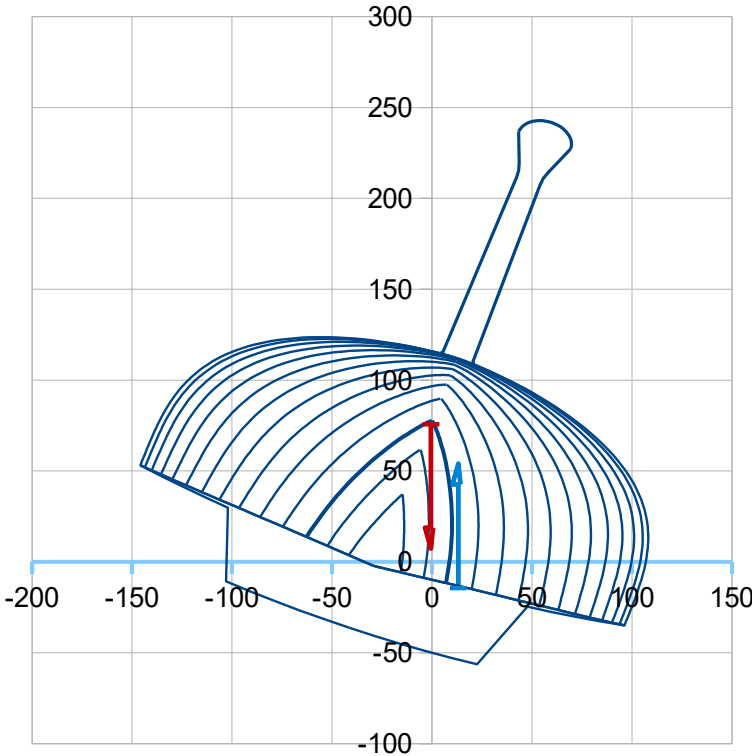


Kroof (%B) = 0 >>> GZ = 0,006 m

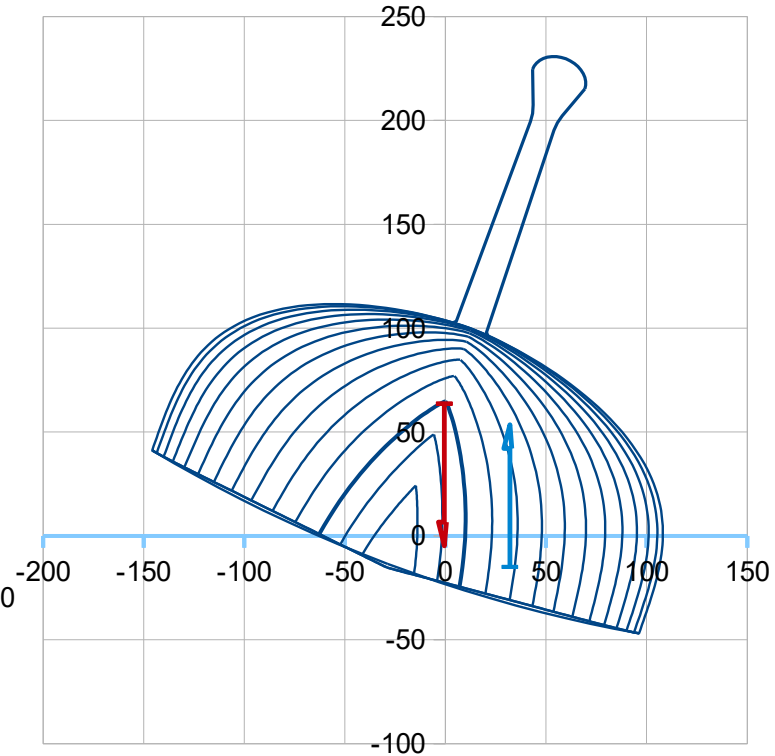


**Example at 160° :**

Kroof (%B) = 29 >>> GZ = - 0,137 m



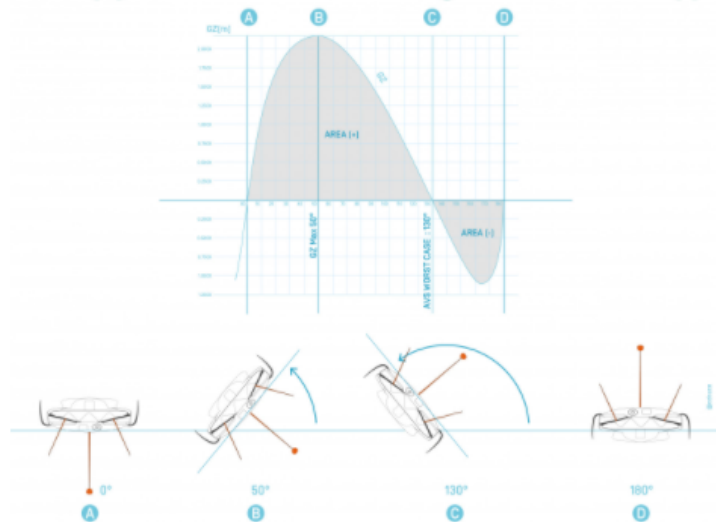
Kroof (%B) = 0 >>> GZ = -0,326 m



The extra volume increases the positive GZ (before the AVS) and decreases the negative GZ (after the AVS) >>> these both increases the AVS and the areas ratio, both favorable for the safety.

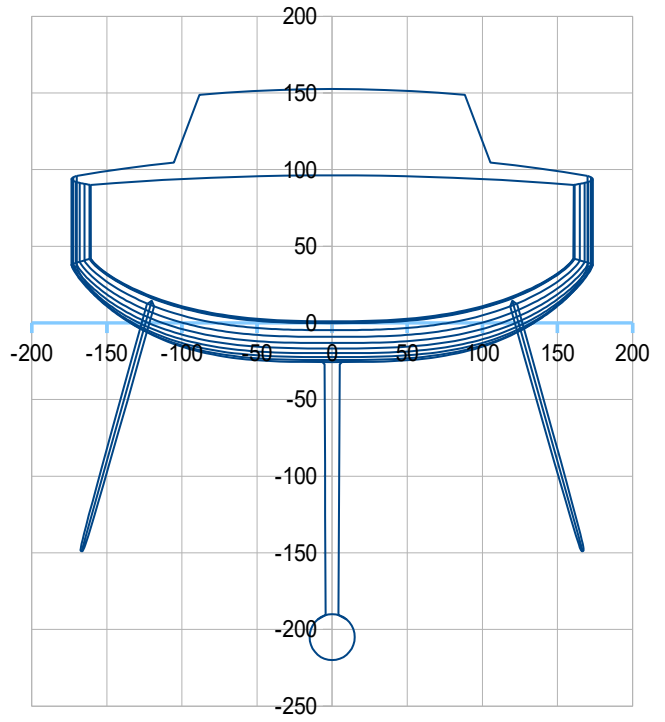
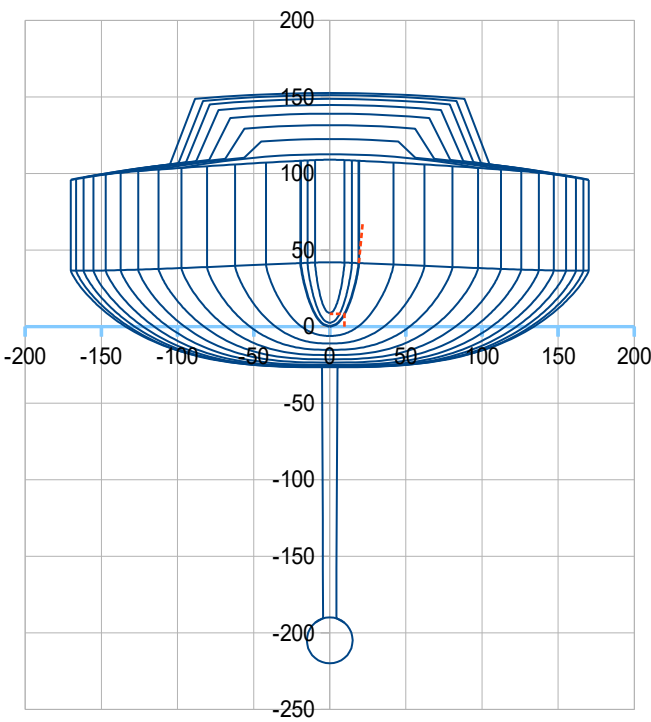
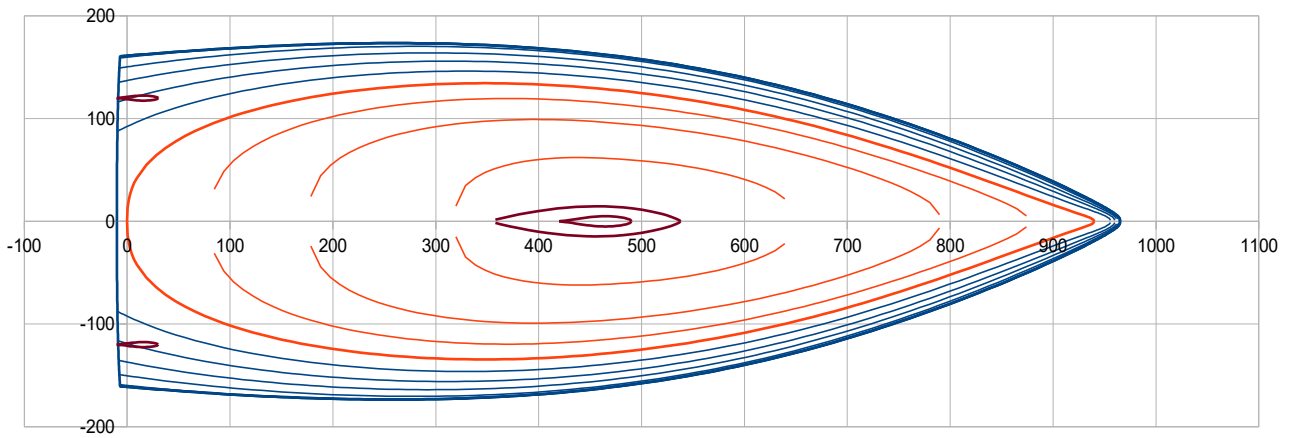
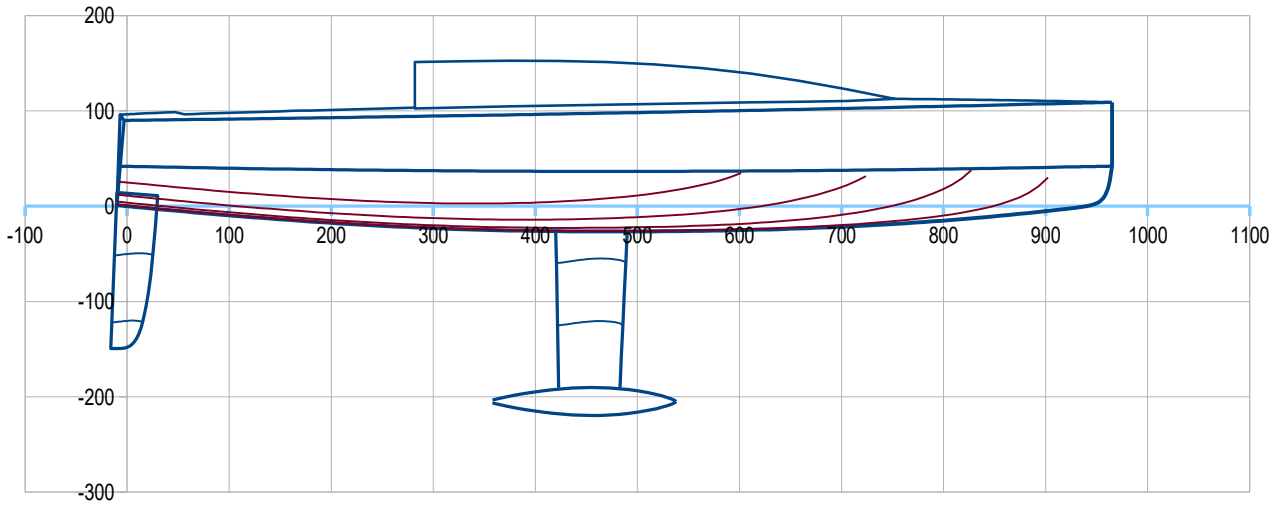
Following the Vendée Globe 1996/1997 where several boats with quasi flat deck were rolled upside down and unfortunately remained stable in this position, the Imoca class added the Aeras ratio > 5 criteria in their rules. That led to new design of the deck & roof volumes in order to reduce a lot this stability upside down, so that the energy brought by the waves can be sufficient to upright again the boat after such a capsizing event.

**IMOCA**  
**CLASS RULE**  
**STABILITY CURVE AREA RATIO**  
**area[+] shall be at least 5 time greater than area[-]**



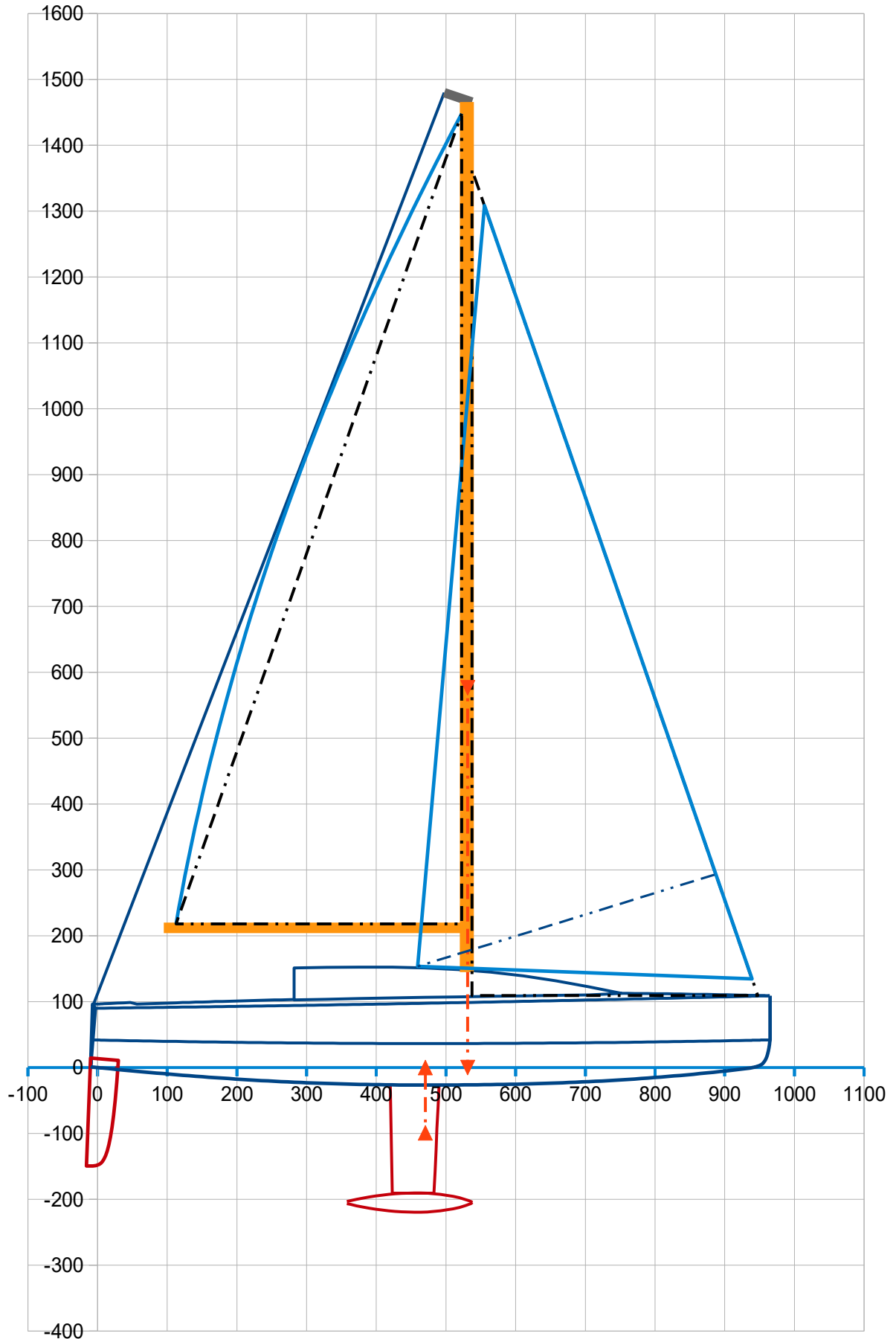
**Dolfi 32S, inspired by Beneteau Figaro III / VPLP**

Loa 9,75 m ; Lwl 9,40 m ; B 3,47 m ; Draft 2,20 m ; Light weight : 3017 kg ; Ballast : 1248 kg



Sailplan :

ur Gene-VPP : Main (m2) 30,27 Jib (m2) 28,35 ZCE (m) 5,97 Zdeck (m) 1,09 Zmast (m) 14,48 Spi (m2) 90,00 ZCE spi (m) 7,16



**Dolfi 32S / Introduction of a load (160 kg) and its position Xg, Zg, Yg :**

**5.1 Mass spreadsheet with input of a load**

Data to enter : yellow cells	Mass (kg)	Xg (m)	Zg (m)	Yg (m)	(in the coordinates of the 2D)
Displacement of ref. (kg)	3016,95	4,303	-0,180	0	from the mass spreadsheet
Load (kg)	160,00	2,00	1,00	0,00	Crew at center
			1,00	1,25	Crew sit windward
<b>Total &gt;&gt;&gt; Mass (kg)</b>	<b>3176,95</b>	<b>4,187</b>	<b>-0,120</b>	<b>0,000</b>	<b>Crew at center</b>
<b>Disp. (m3)</b>	<b>3,09946</b>		<b>-0,120</b>	<b>0,063</b>	<b>Crew sit windward</b>

**Dolfi 32S / Computation of the GZ (with a flush deck , Kroof = 0)**

**GZ data storage (by copy/special paste)**

**With another Zg**

**0,000** < to input

Heel (°)	Trim (°)	GZ (m)	GZ (m)
0,00	0,322	0,000	0,000
5,00	0,241	0,231	0,220
10,00	0,007	0,440	0,419
15,00	-0,355	0,614	0,583
20,00	-0,805	0,754	0,713
25,00	-1,280	0,855	0,804
30,00	-1,745	0,925	0,865
35,00	-2,193	0,970	0,901
40,00	-2,626	0,993	0,915
45,00	-3,020	0,998	0,913
50,00	-3,388	0,998	0,906
55,00	-3,724	0,990	0,892
60,00	-4,016	0,974	0,870
65,00	-4,284	0,956	0,847
70,00	-4,431	0,965	0,851
75,00	-4,602	0,903	0,787
80,00	-4,729	0,833	0,714
85,00	-4,800	0,754	0,634
90,00	-4,805	0,669	0,549
95,00	-4,765	0,577	0,457
100,00	-4,677	0,481	0,362
105,00	-4,516	0,381	0,264
110,00	-4,318	0,277	0,164
115,00	-4,062	0,171	0,062
120,00	-3,771	0,065	-0,039
125,00	-3,428	-0,040	-0,139
130,00	-3,049	-0,143	-0,236
135,00	-2,641	-0,243	-0,328
140,00	-2,210	-0,338	-0,415
145,00	-1,757	-0,424	-0,493
150,00	-1,287	-0,500	-0,560
155,00	-0,830	-0,564	-0,615
160,00	-0,398	-0,611	-0,652
165,00	0,022	-0,621	-0,652
170,00	0,403	-0,568	-0,589
175,00	0,700	-0,398	-0,409
180,00	0,802	0,000	0,000

**AVS (°)**

**123,09**

**Areas ratio**

**3,79**

**AVS (°)**

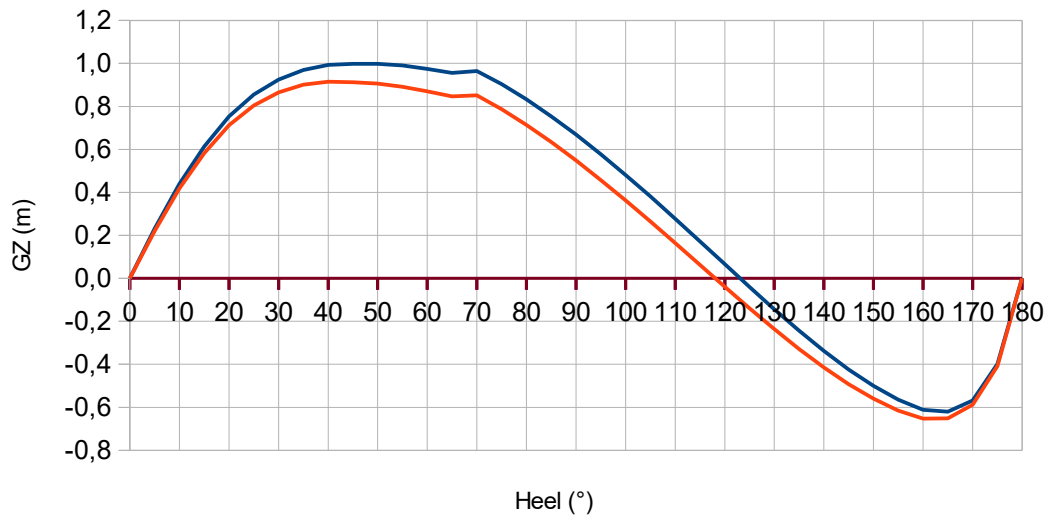
**118,08**

**Areas ratio**

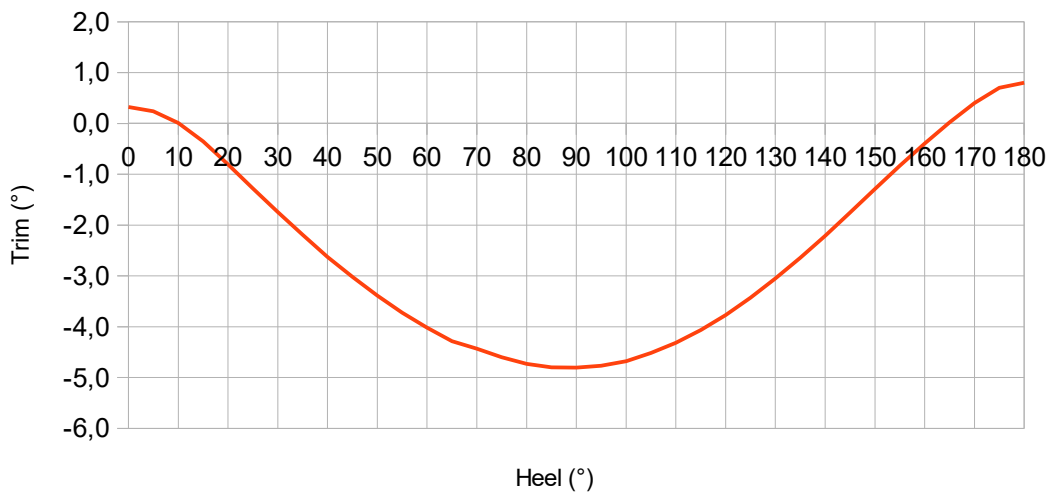
**2,88**

## GZ curve

Blue : with initial Zg ; Red : with another Zg

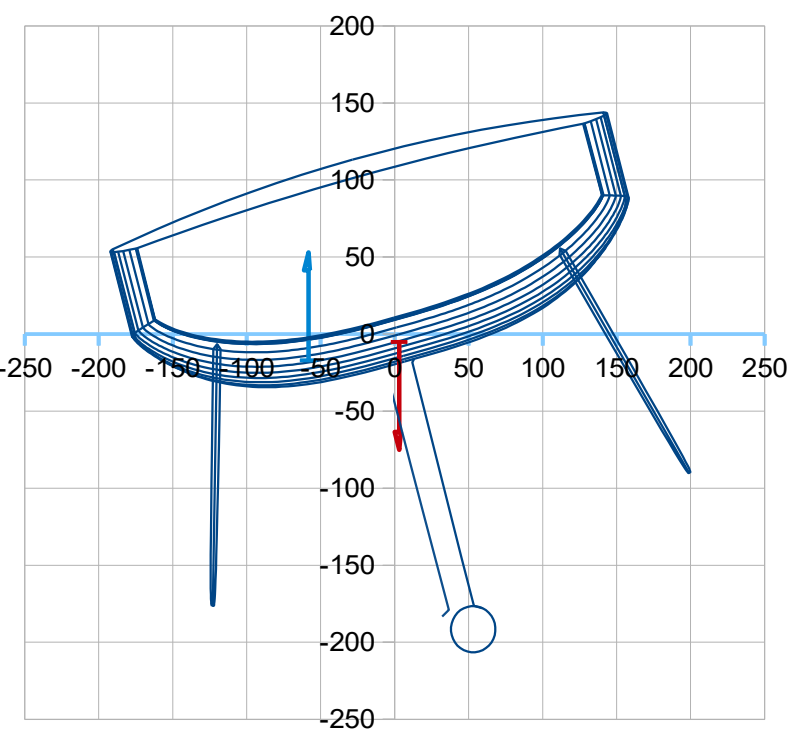
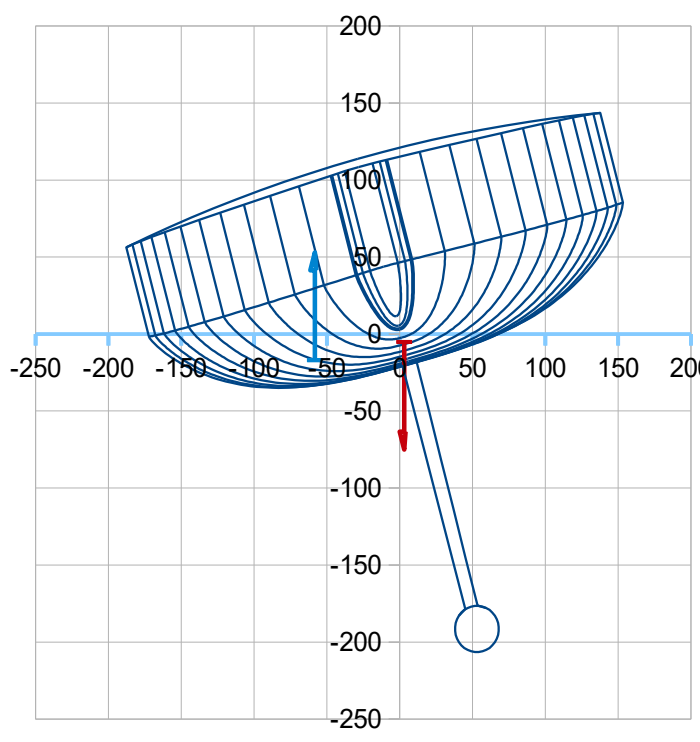


## Trim (computed in the fixed vertical plan)

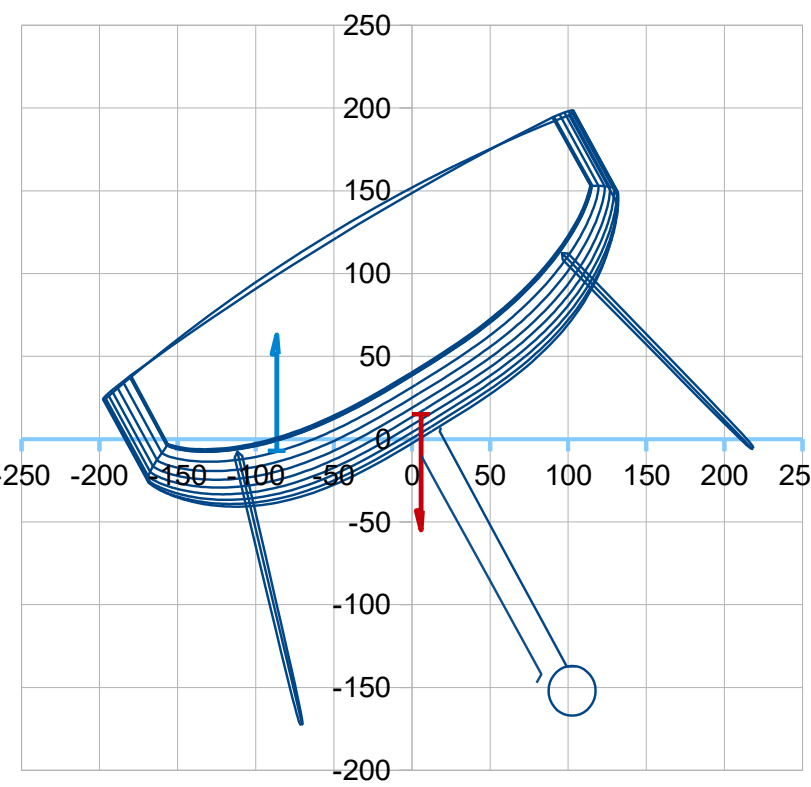
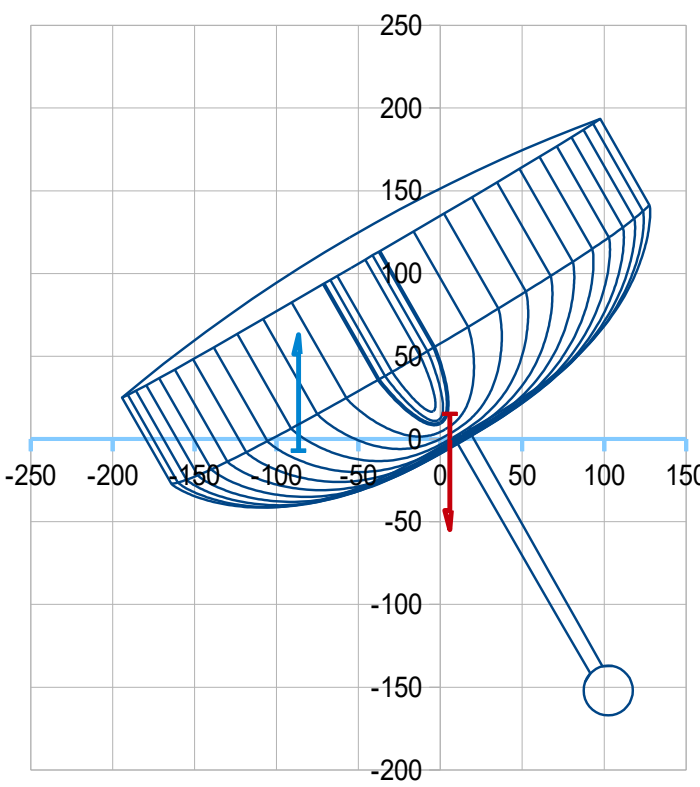


**Dolfi 32S / Some typical heeling configurations :**

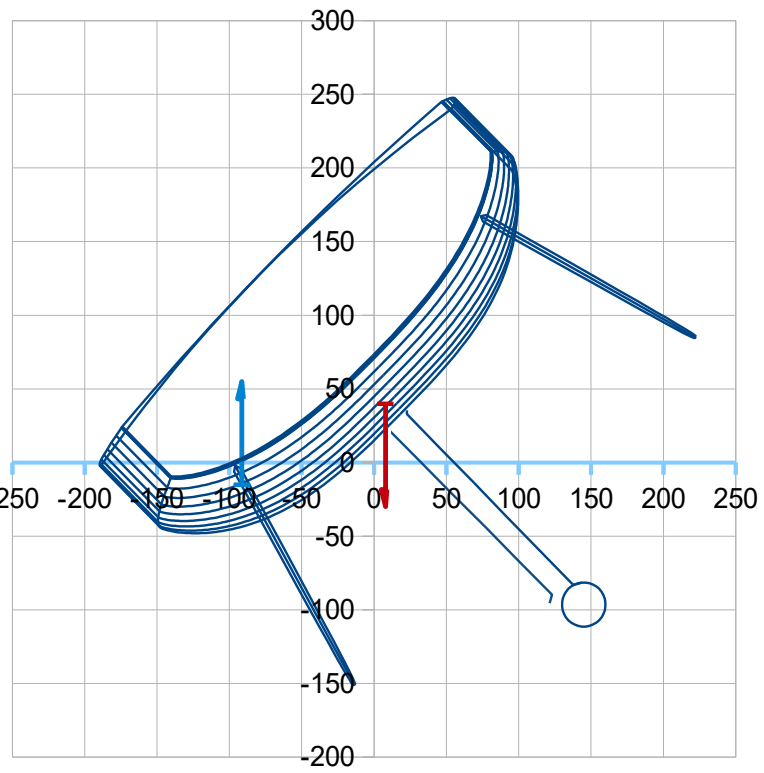
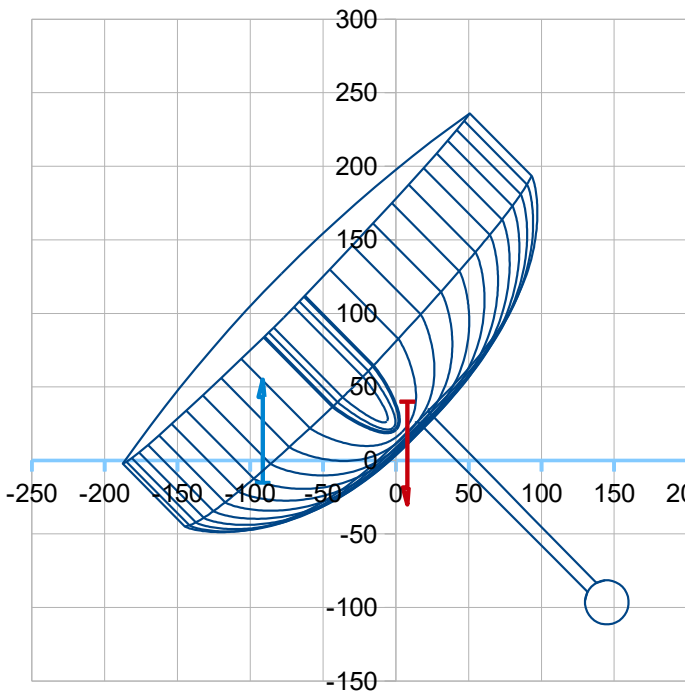
**At heel 15° >>> GZ = 0,614 m**



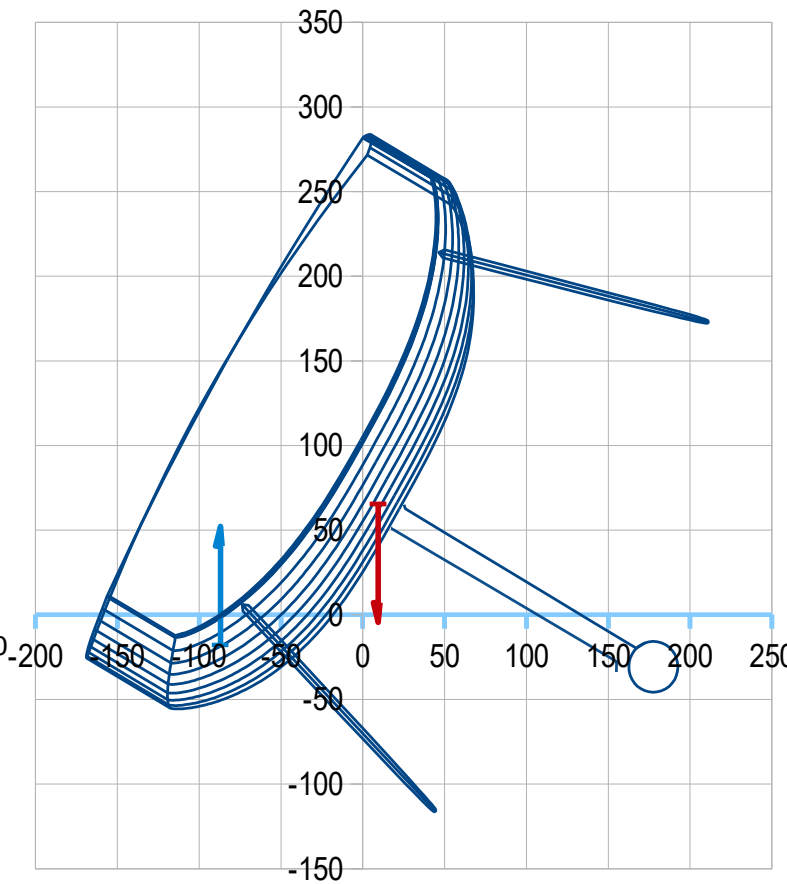
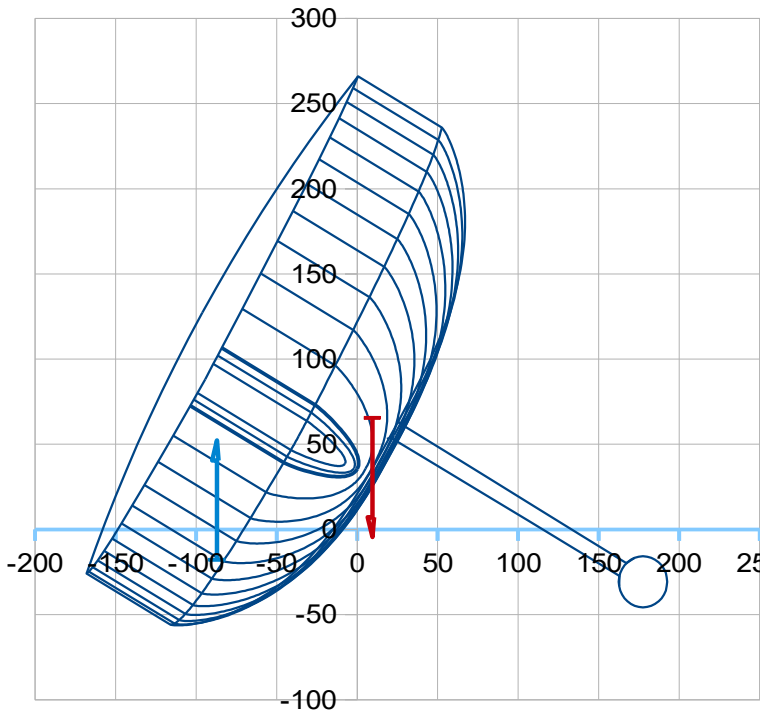
**At heel 30° >>> GZ = 0,925 m**



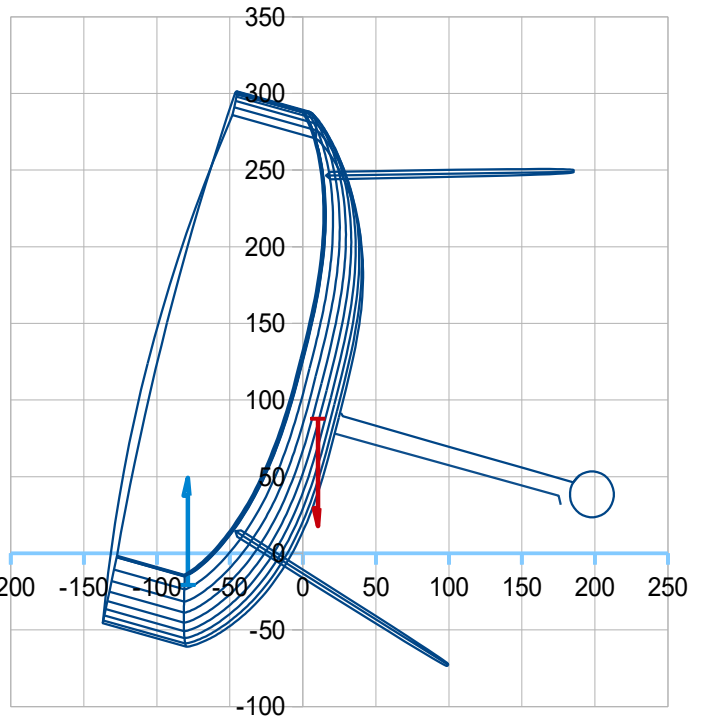
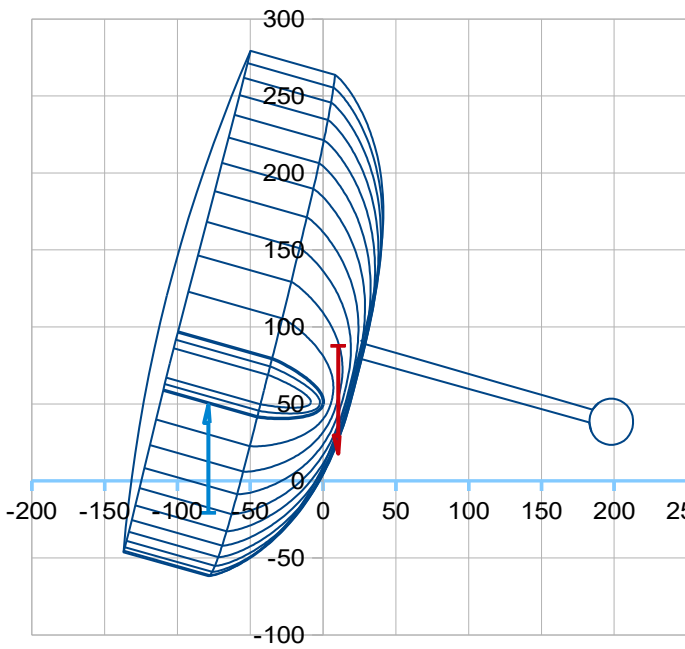
At heel 45° >>> GZ = 0,998 m



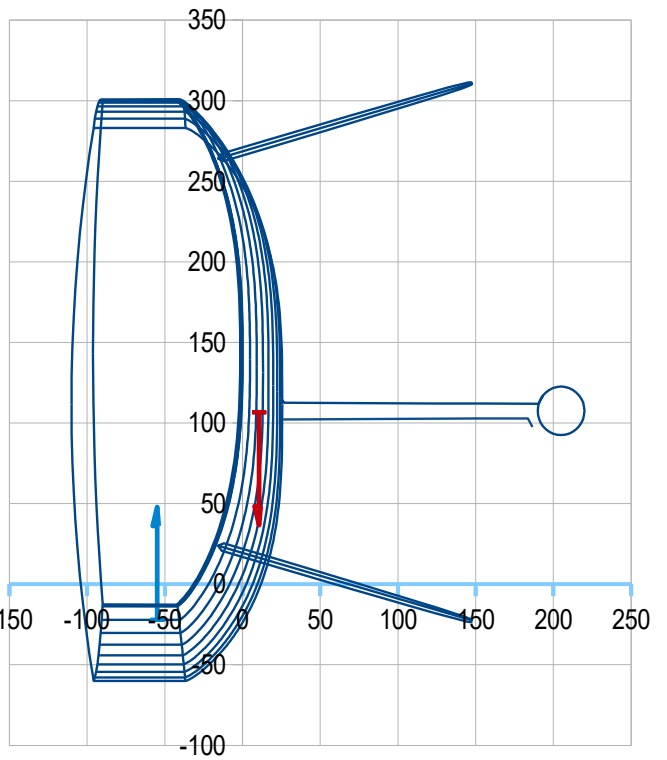
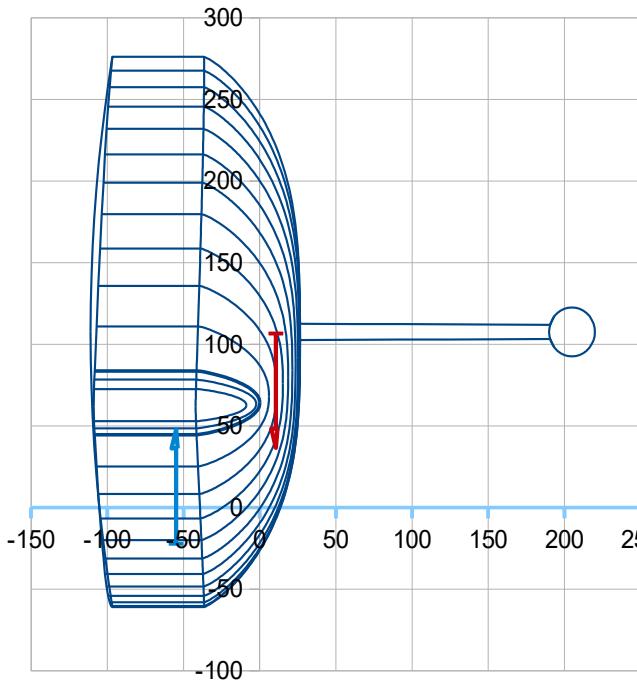
At heel 60° >>> GZ = 0,974 m



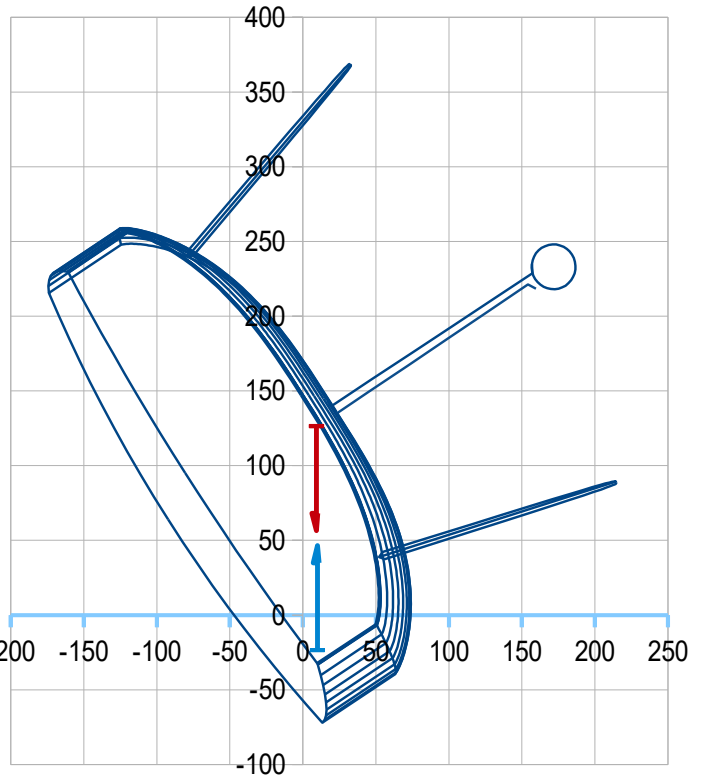
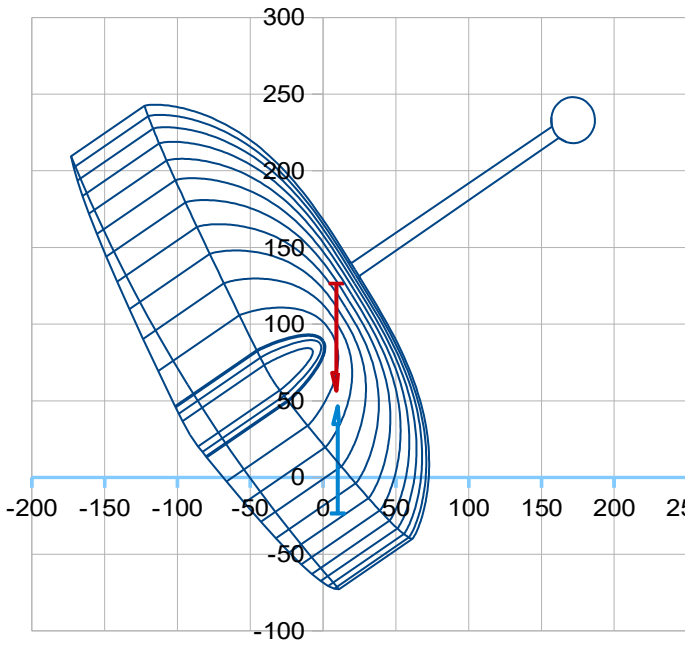
At heel 75° >>> GZ = 0,903 m



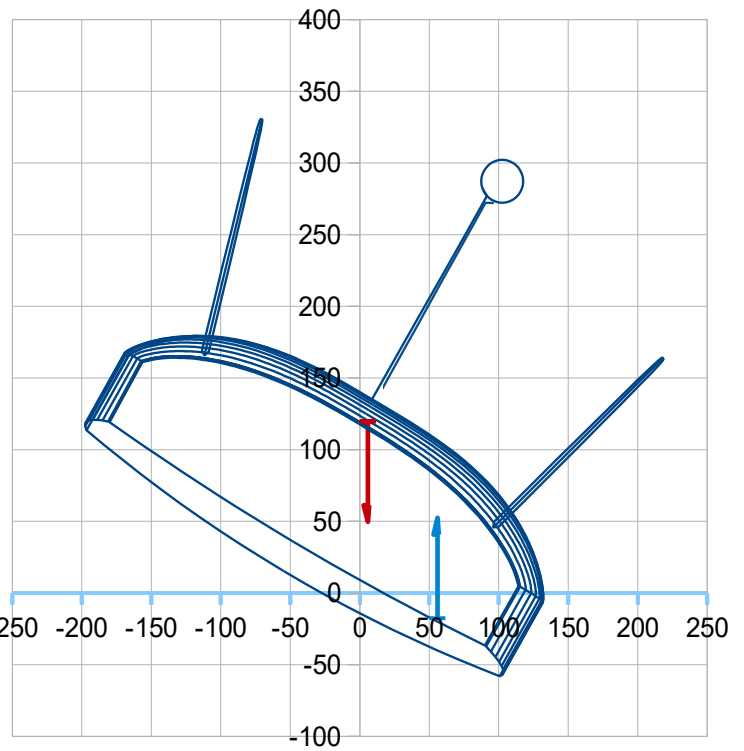
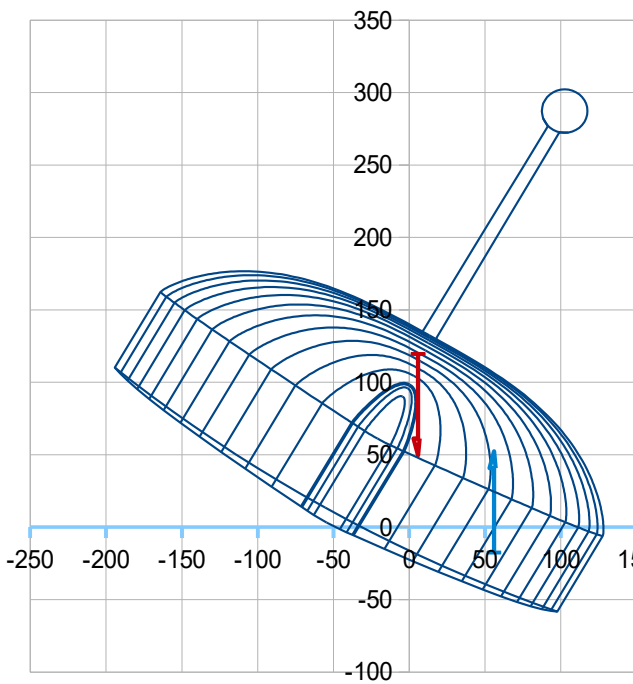
At heel 90° >>> GZ = 0,669 m



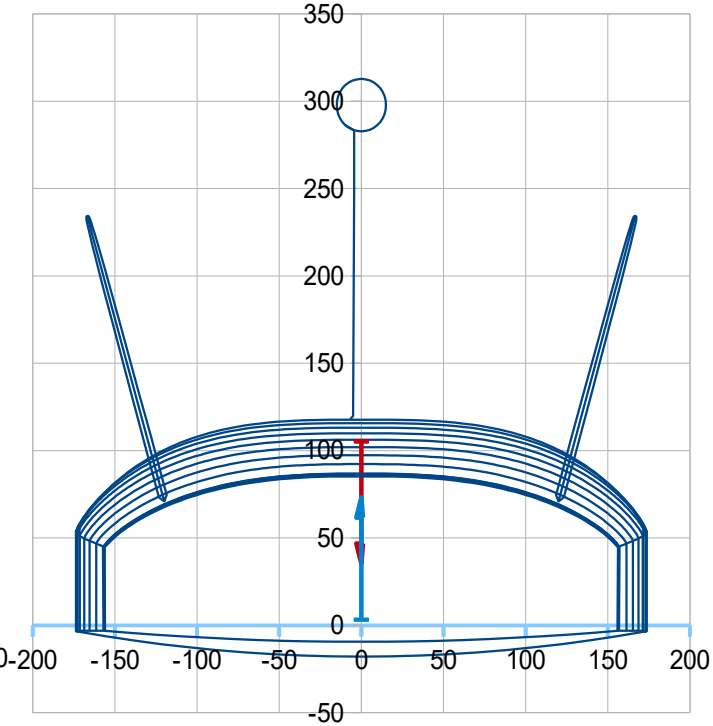
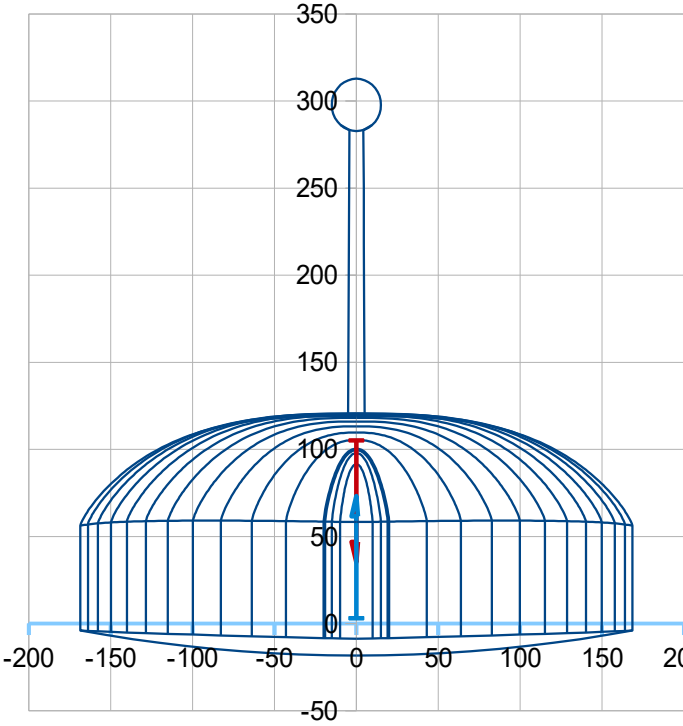
At heel 123,09° >>> GZ = 0,000 m AVS Angle of Vanishing Stability



At heel 150° >>> GZ = - 0,500 m



At heel 180 ° >>> GZ = 0,00 m



**Dolfi 32S / STIX** (with assuming PhiD = 115° for a first downflooding occurrence).

**STIX according to ISO 12217-2 2013 for Sailboat of Length > 6 m**

**Input data (in yellow cells the necessary input, in blue the data coming from Stab)**

<b>Hull length</b> excluded bolted on extensions (bowsprit, stem roller, etc...)	LH (m)	9,750	
<b>Hull width</b> excluded bolted on extensions (cab rails, rub rails, etc ...)	BH (m)	3,470	
<b>Displacement</b> (ISO consider either mMO Minimum Operating condition or mLA Loaded Arrival condition)	m (kg)	3177	
<b>Length waterplane</b> (to put heel = 0 in Stab)	Lwl (m)	9,322	
<b>Beam waterplane</b> (to put heel = 0 in Stab)	Bwl (m)	2,741	
<b>Sail area</b> (Mainsail + fore triangle)	As (m2)	58,7	<<< to input
<b>Height of sail area centroid</b> (/H0)	hCE (m)	5,97	<<< to input
<b>Height of center (m) of lateral area</b> below the waterline when the boat is upright (/H0)	hLP (m)	0,706	
<b>Height of waterline in loading condition</b> (to put heel = 0 in Stab)	(m)	0,005	

**Data coming from the GZ Curve :**

		With Zg (m)	With Zg (m)
<b>Righting arm at 90°</b>	GZ90° (m)	-0,120	0,000
<b>First occurring downflooding angle</b>	PhiD (deg)	115	115
>> <b>Righting arm at downflooding angle</b> (Computed in Stab)	GZD (m)	0,171	0,062
<b>Angle of vanishing stability</b>	AVS (deg)	123,1	118,1
<b>Area under the GZ curve up to AVS</b>	AGZ (m.deg)	83,707	73,311
<b>Computation of the STIX parameters</b>			
	LBS (m)	9,465	9,465
	FL	0,970	0,970
(0,75 – 1,25)	FDL	0,901	0,901
	FB	2,507	2,507
(0,75 – 1,25)	FBD	0,817	0,817
	FR	3,035	2,489
(0,5 – 1,5)	FKR	1,128	1,082
(0,4 – 1,5)	FIR	1,001	0,960
(0,5 – 1,0)	FWM	1,000	1,000
(0,5 – 1,5)	FDS	1,172	1,126
(0,5 – 1,25)	FDF	1,250	1,250

<<< to input

>> <b>STIX</b>	31,2	29,4
>> <b>AVS (°)</b>	123,1	118,1
>>> <b>Righting Energy (m.deg.kg)</b>	265 934	232 905
<b>Areas ratio</b>	3,8	2,9

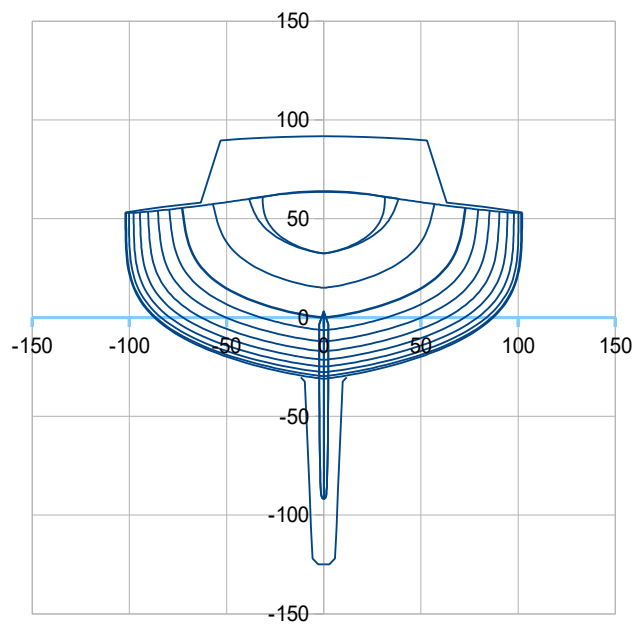
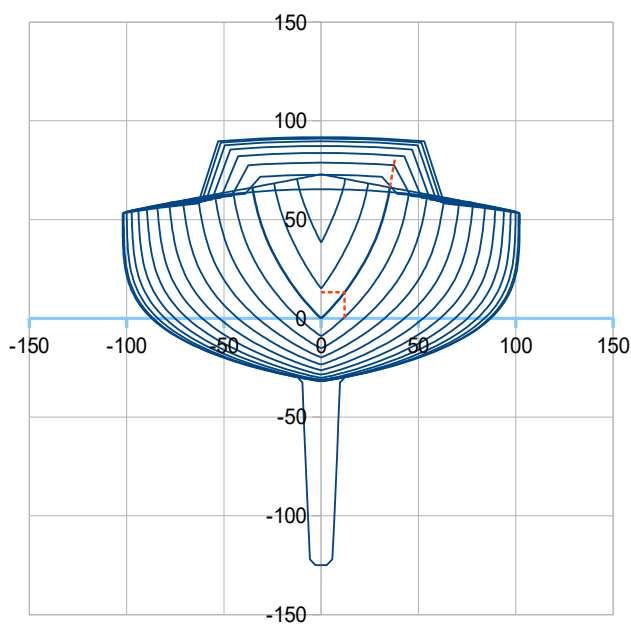
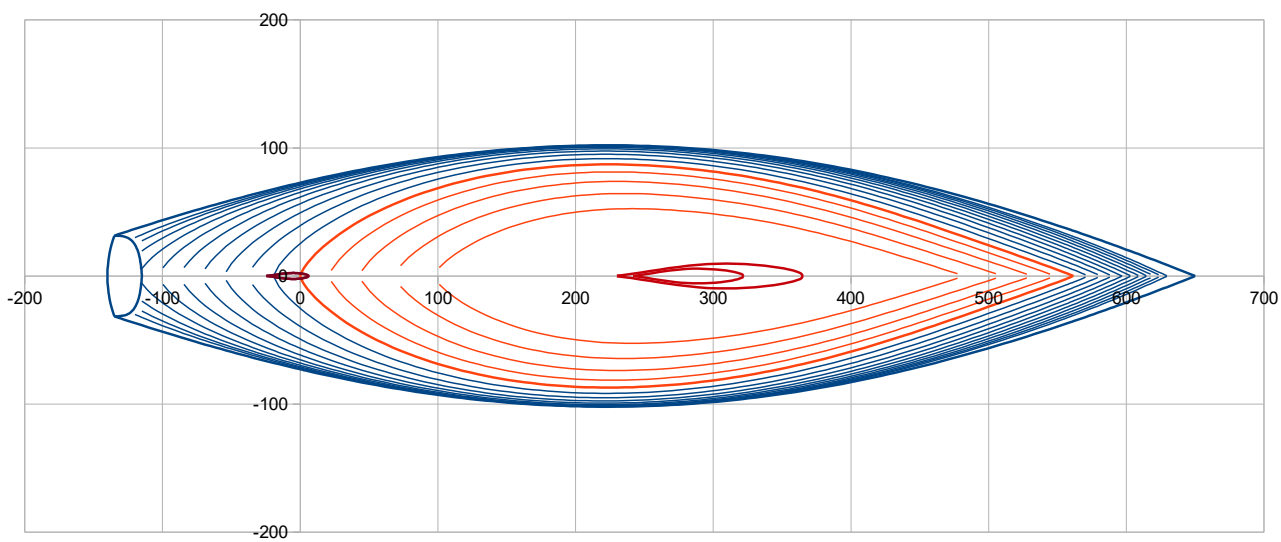
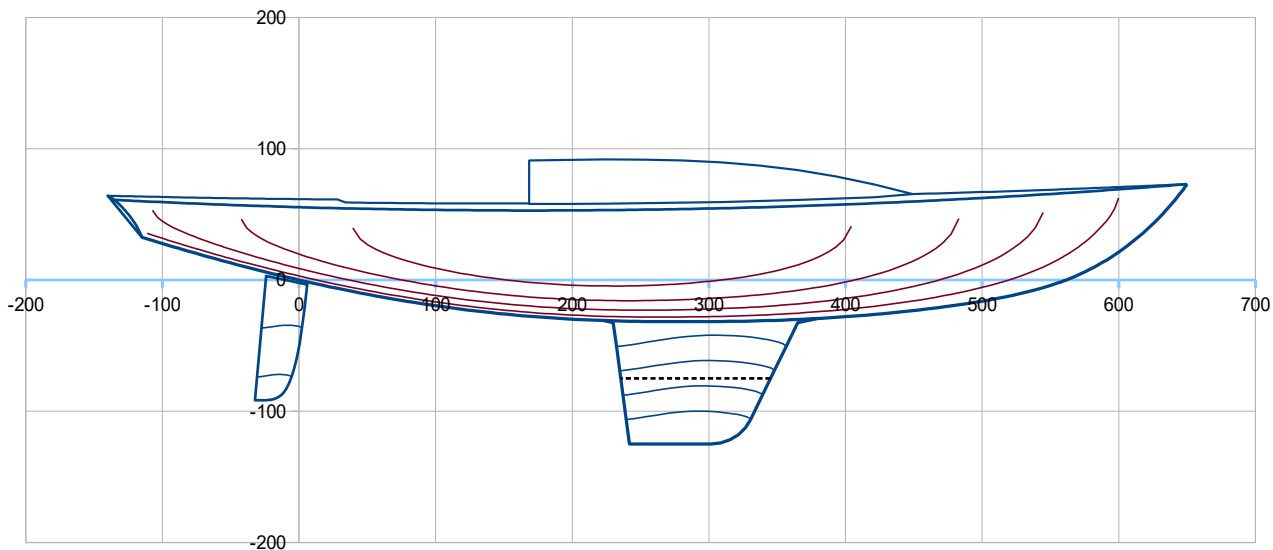
To compare with :

Design category	Cat. A	Cat. B	Cat. C	Cat. D
<b>STIX Lower limit</b>	32	23,0	14,0	5
<b>AVS (°) mini required</b>	123,7	114,3	90,0	75
<b>Righting energy (m.deg.kg) mini required</b>	172 000	57 000		

>>> Here, a classification in Cat. B is easy, but not possible for the Cat. A : the STIX is a bit too small (31,2 < 32 mini requested), the AVS is a bit above the threshold 123,7° although the Righting energy is easily above the threshold.

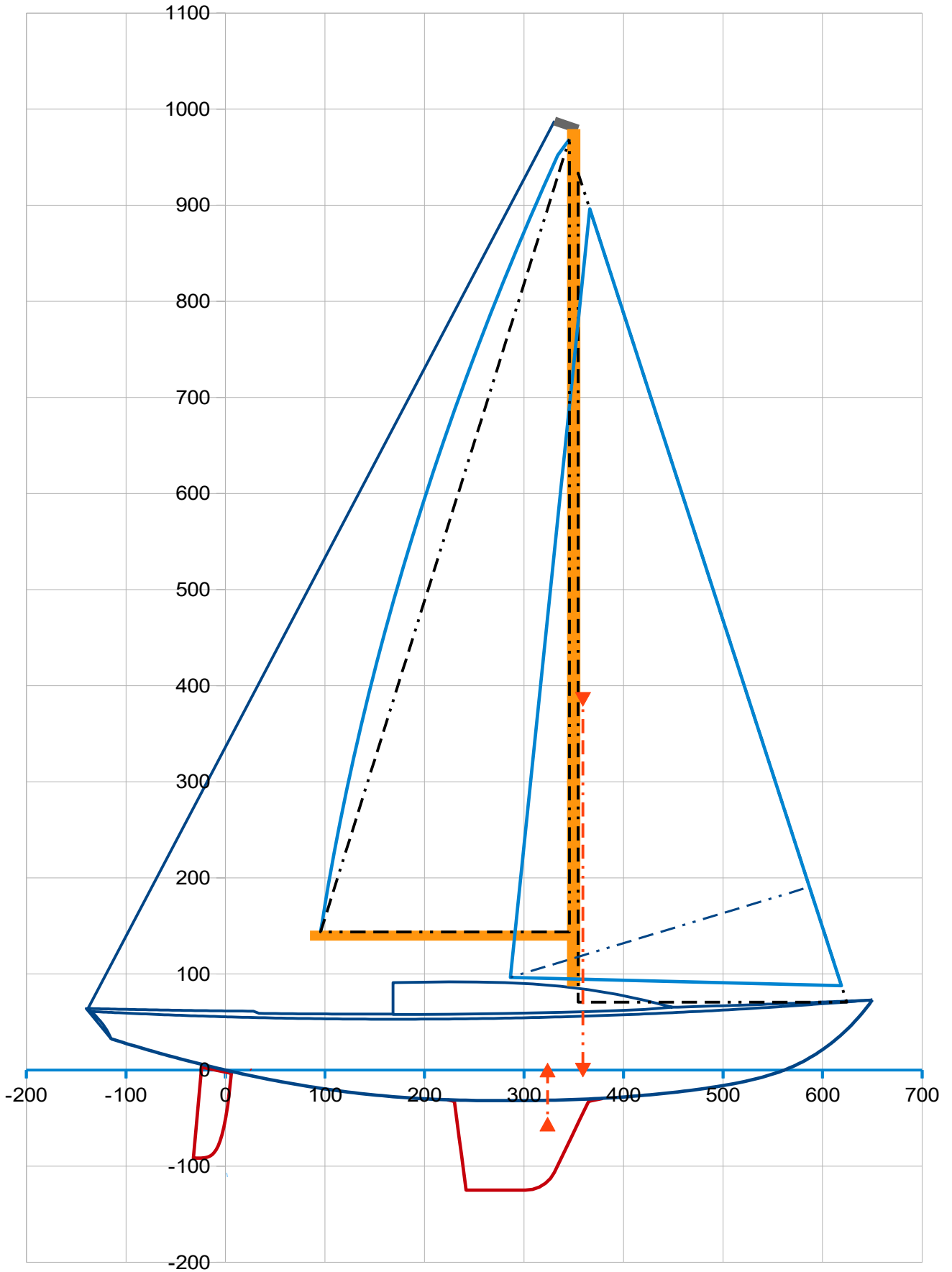
**DH17, inspired by Dark Harbor 17,5 / B.B. Crownwinshield**

Loa 7,90 m ; Lwl 5,62 m ; B 2,04 m ; Draft 1,25 m ; Light weight : 1214 kg ; Ballast : 500 kg



Sailplan :

or Gene-VPP : Main (m2) 12,50 Jib (m2) 13,61 ZCE (m) 3,99 Zdeck (m) 0,71 Zmast (m) 9,69 Spi (m2) 30,00 ZCE spi (m) 4,79



**DH17 / Introduction of a load (150 kg) and its position Xg, Zg, Yg :**

**Mass spreadsheet with input of a load**

	Mass (kg)	Xg (m)	Zg (m)	Yg (m)	(in the coordinates of the 2D
<b>Data to enter : yellow cells</b>					
Boat light weight (kg)	1213,87	2,652	-0,136	0	from the mass spreadsheet
Load (kg)	150,00	1,20	0,65	0,00	Crew at center
			0,65	0,00	Crew sit windward
<b>Total &gt;&gt;&gt; Mass (kg)</b>	<b>1363,87</b>	<b>2,492</b>	<b>-0,049</b>	<b>0,000</b>	<b>Crew at center</b>
<b>Disp. (m3)</b>	<b>1,33061</b>		<b>-0,049</b>	<b>0,000</b>	<b>Crew sit windward</b>

**DH17 / Computation of the GZ (with a flush deck , Kroof = 0)**

**GZ data storage (by copy/special paste)**

Heel (°)	Trim (°)	GZ (m)
0,00	0,864	0,000
5,00	0,833	0,077
10,00	0,749	0,148
15,00	0,619	0,213
20,00	0,452	0,269
25,00	0,251	0,318
30,00	0,025	0,360
35,00	-0,214	0,396
40,00	-0,458	0,423
45,00	-0,693	0,439
50,00	-0,908	0,446
55,00	-1,094	0,446
60,00	-1,256	0,441
65,00	-1,398	0,440
70,00	-1,528	0,448
75,00	-1,616	0,445
80,00	-1,622	0,410
85,00	-1,625	0,372
90,00	-1,628	0,331
95,00	-1,606	0,287
100,00	-1,561	0,240
105,00	-1,500	0,192
110,00	-1,414	0,142
115,00	-1,310	0,092
120,00	-1,194	0,042
125,00	-1,063	-0,007
130,00	-0,919	-0,053
135,00	-0,774	-0,098
140,00	-0,619	-0,138
145,00	-0,464	-0,173
150,00	-0,313	-0,202
155,00	-0,169	-0,222
160,00	-0,042	-0,230
165,00	0,059	-0,221
170,00	0,129	-0,188
175,00	0,162	-0,115
180,00	0,179	0,000

**With another Zg**

**0,000** < to input

**GZ (m)**

0,000
0,072
0,140
0,200
0,253
0,297
0,336
0,368
0,391
0,404
0,409
0,405
0,398
0,396
0,402
0,397
0,362
0,323
0,282
0,238
0,192
0,144
0,096
0,048
0,000
-0,047
-0,091
-0,133
-0,170
-0,202
-0,227
-0,243
-0,247
-0,234
-0,196
-0,119
0,000

**AVS (°)**

**124,32**

**Areas ratio**

**4,68**

**AVS (°)**

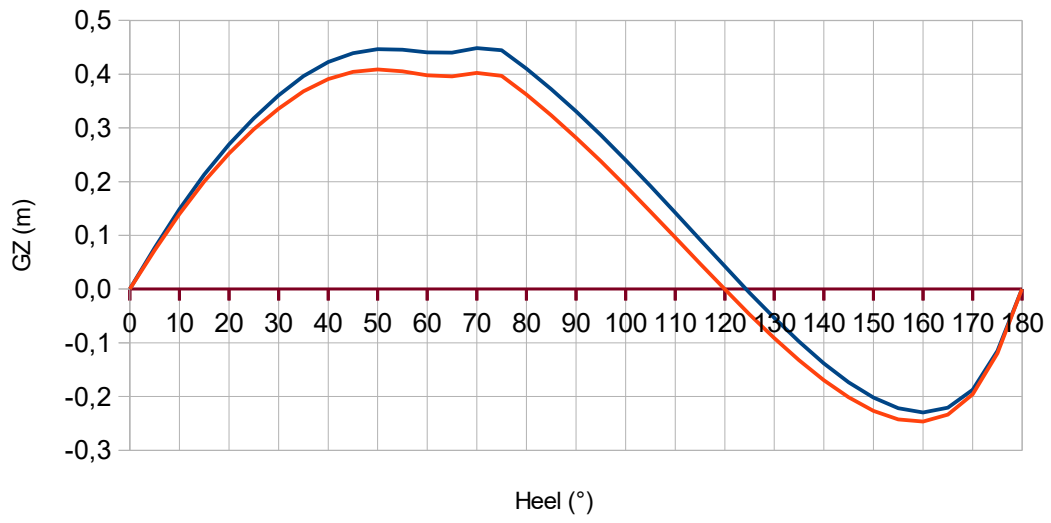
**119,98**

**Areas ratio**

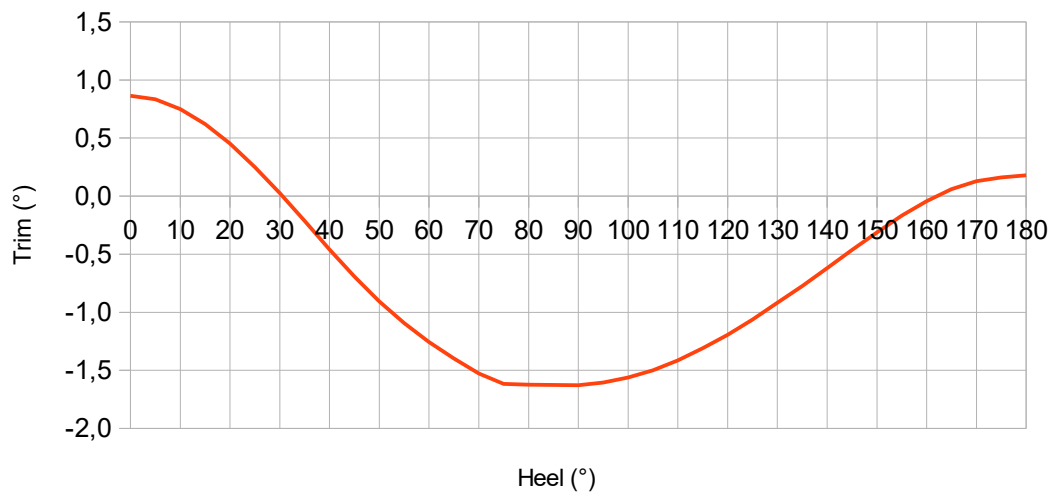
**3,47**

## GZ curve

Blue : with initial  $Z_g$  ; Red : with another  $Z_g$

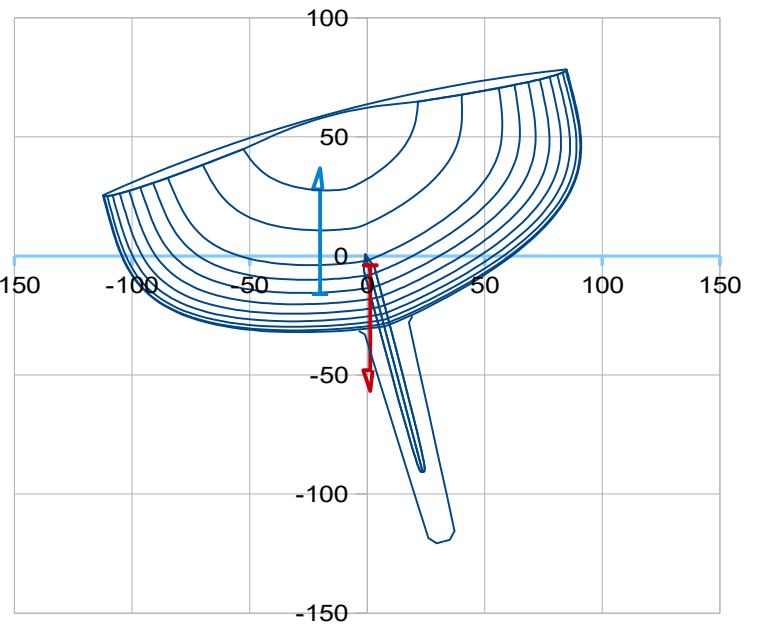
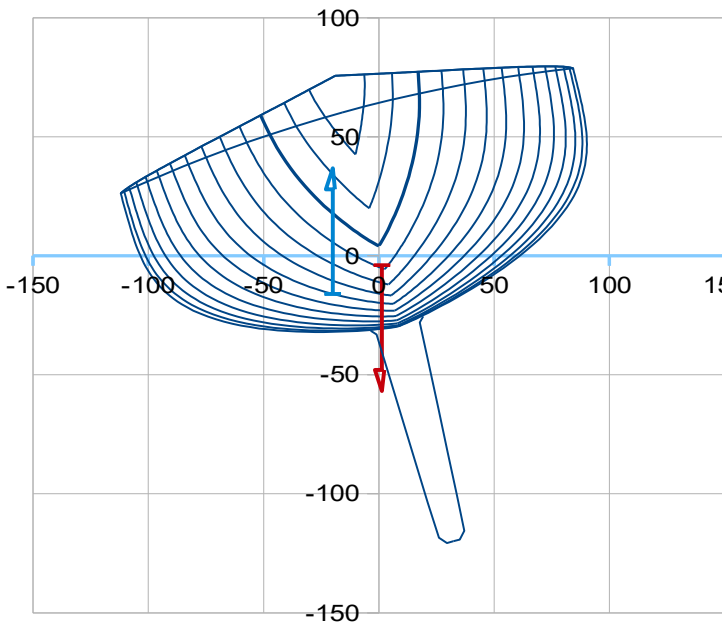


## Trim (computed in the fixed vertical plan)

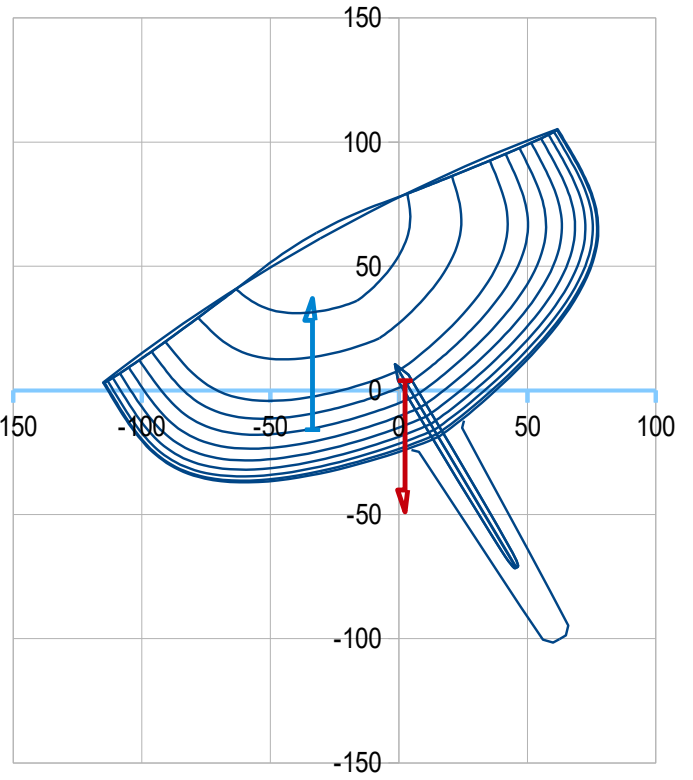
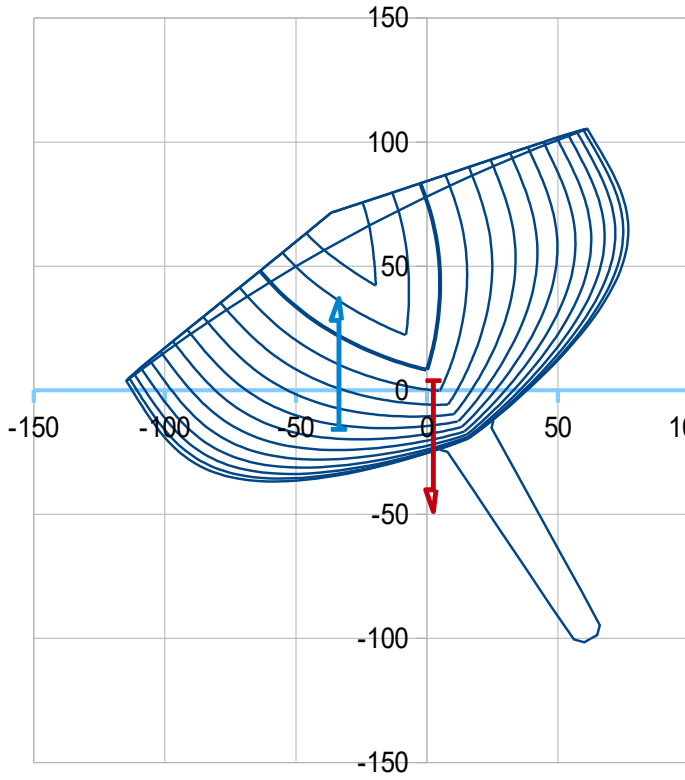


**DH17 / Some typical heeling configurations :**

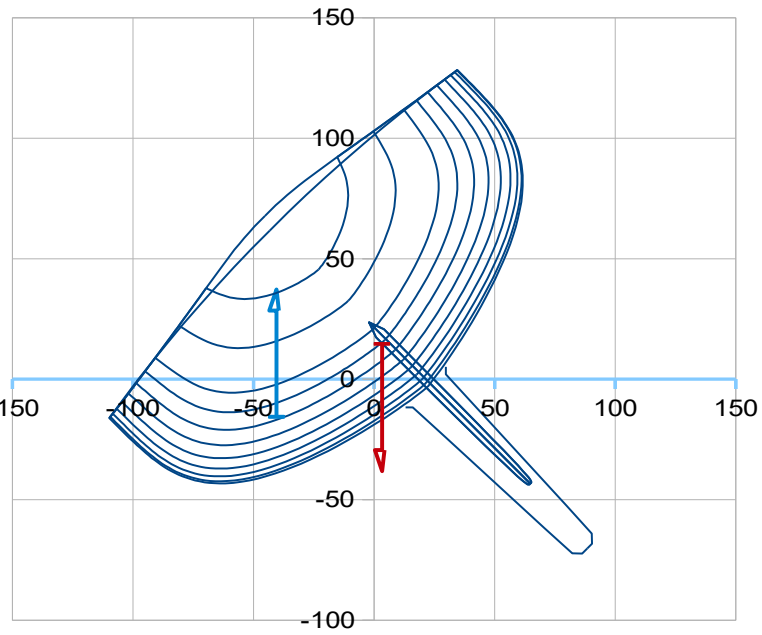
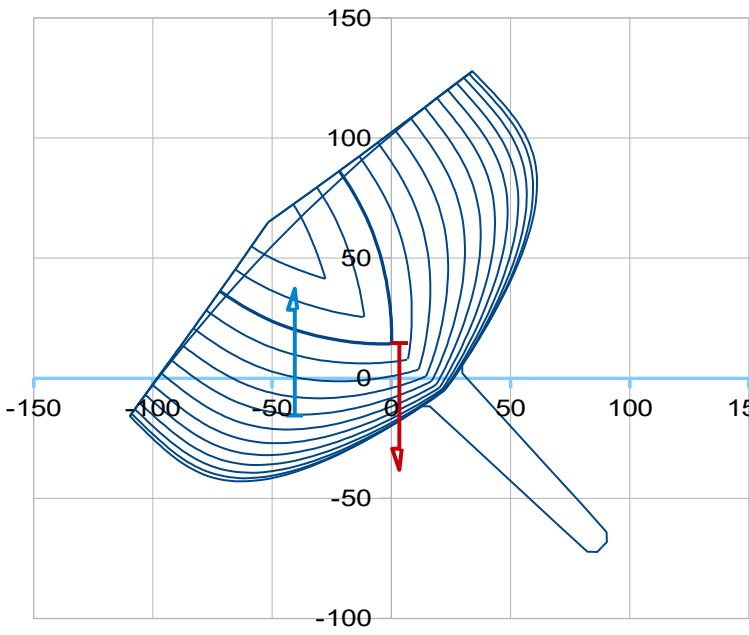
**At heel 15° >>> GZ = 0,213 m**



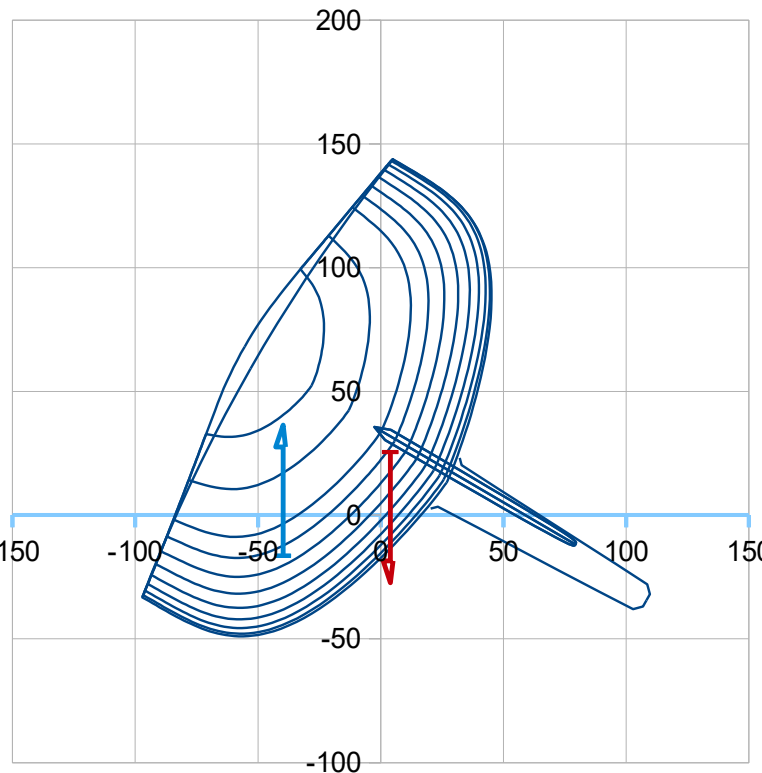
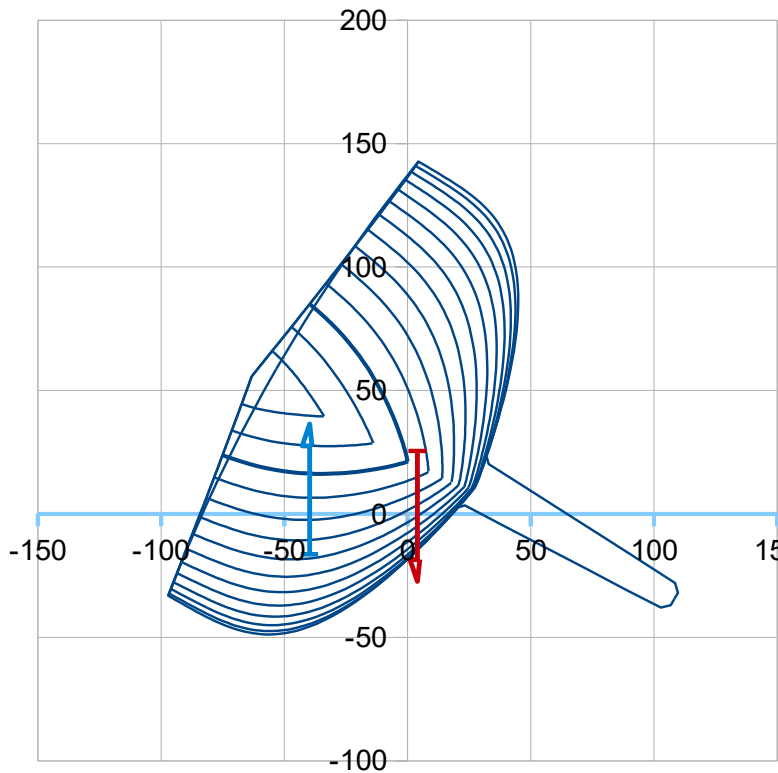
**At heel 30° >>> GZ = 0,360 m**



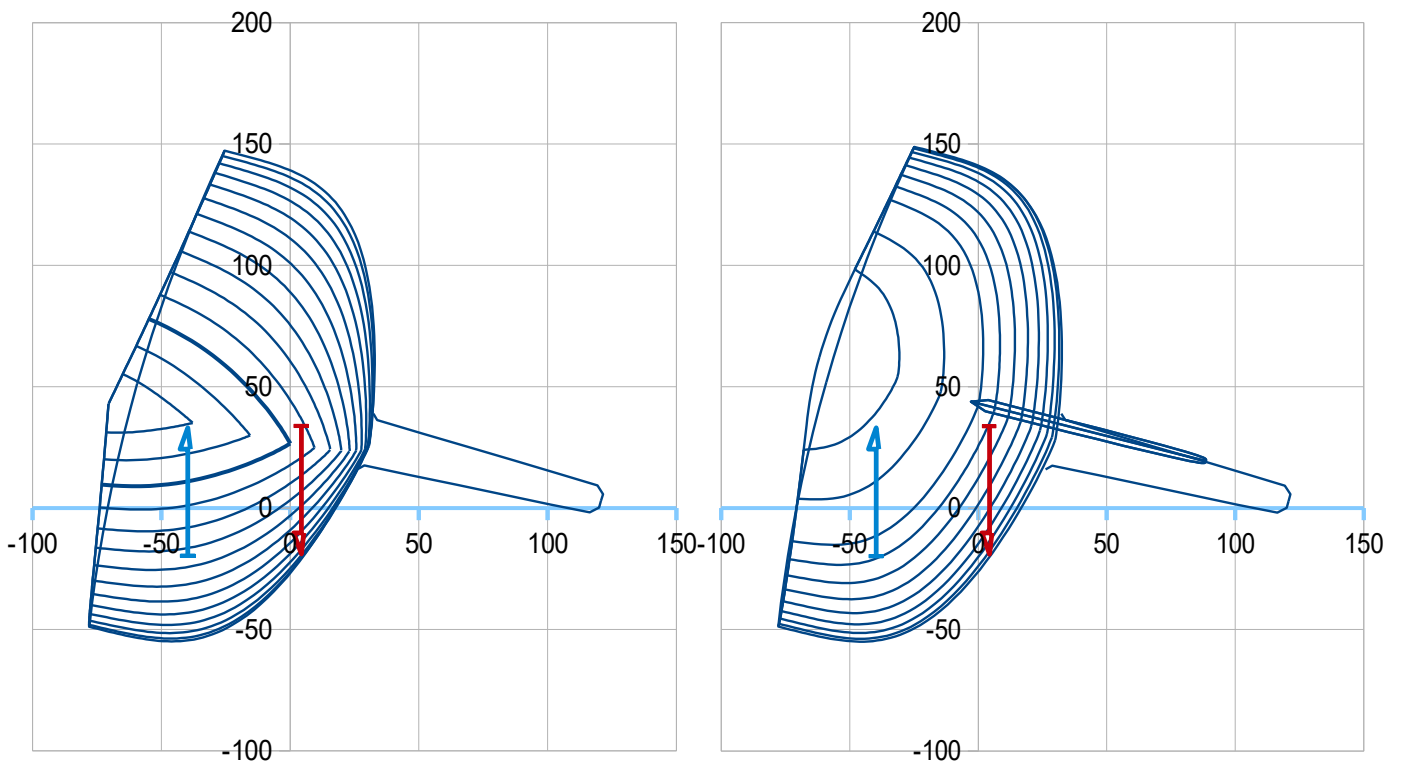
At heel 45° >>> GZ = 0,439 m



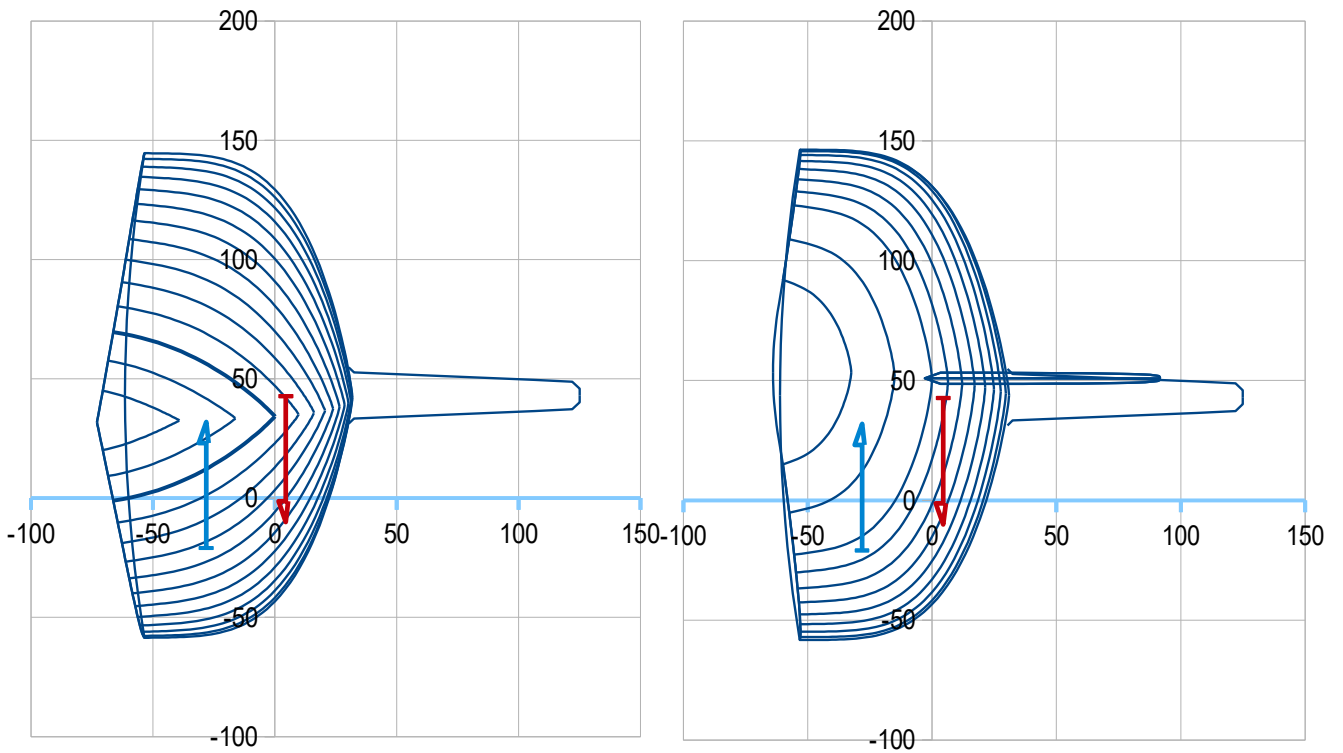
At heel 60° >>> GZ = 0,441 m



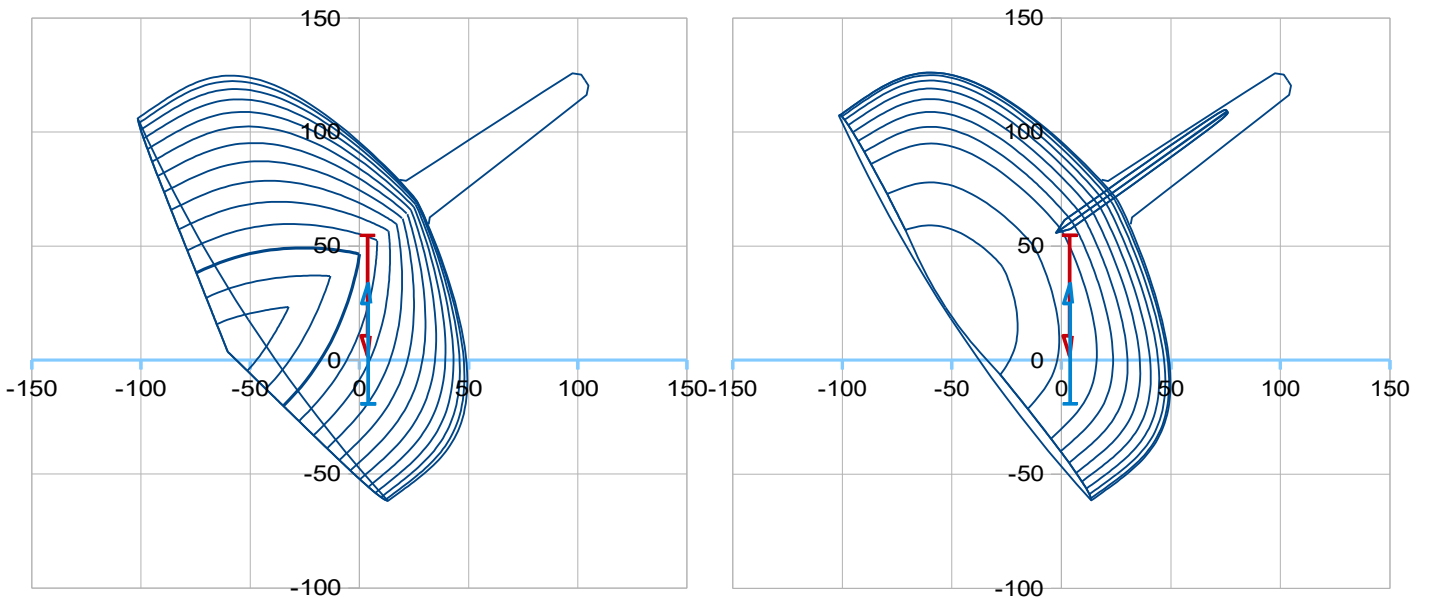
At heel 75° >>> GZ = 0,445 m



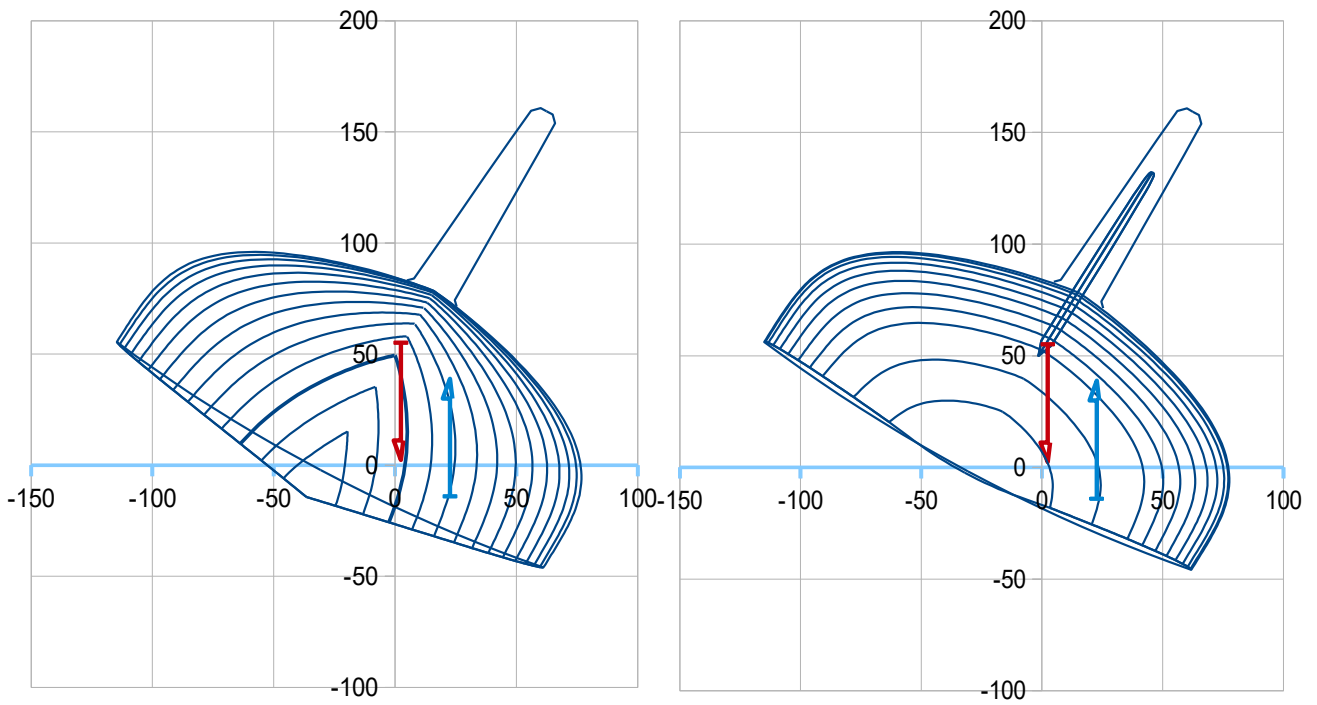
At heel 90° >>> GZ = 0,331 m



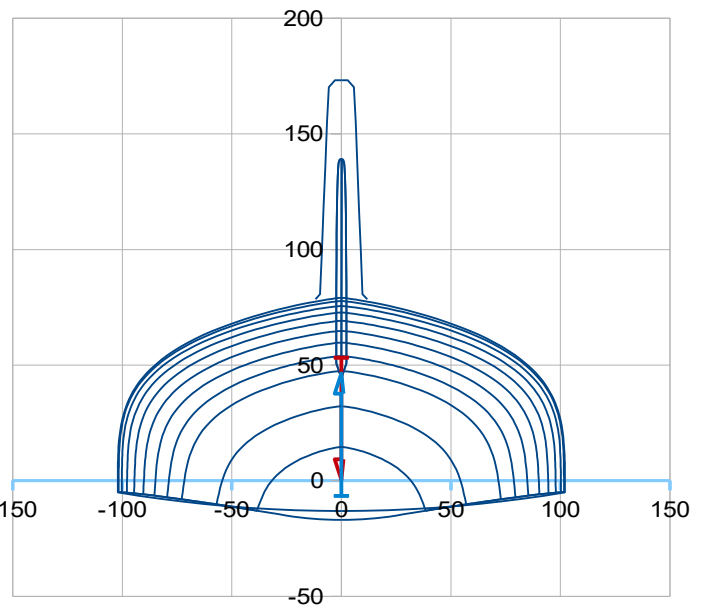
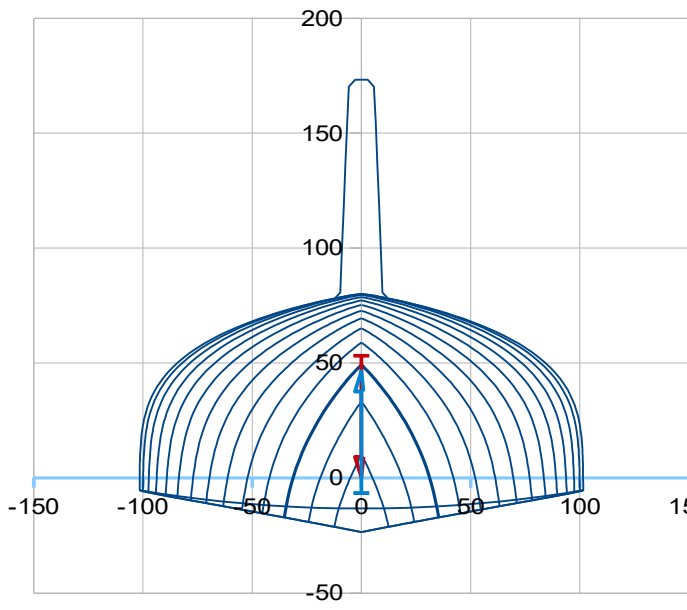
**At heel 124,32° >>> GZ = 0,000 m AVS Angle of Vanishing Stability**



**At heel 150° >>> GZ = - 0,202 m**



At heel 180 ° >>> GZ = 0,00 m



**DH17 / STIX** (with assuming PhiD = 95° for a first downflooding occurrence).

**STIX according to ISO 12217-2 2013 for Sailboat of Length > 6 m**

**Input data (in yellow cells the necessary input, in blue the data coming from Stab)**

Hull length excluded bolted on extensions (bowsprit, stem roller, etc...)	LH (m)	7,900	
Hull width excluded bolted on extensions (cab rails, rub rails, etc ...)	BH (m)	2,040	
Displacement (ISO consider either mMO Minimum Operating condition or mLA Loaded Arrival condition)	m (kg)	1364	
Length waterplane (to put heel = 0 in Stab)	Lwl (m)	5,739	
Beam waterplane (to put heel = 0 in Stab)	Bwl (m)	1,792	
Sail area (Mainsail + fore triangle)	As (m2)	26,1	<<< to input
Height of sail area centroid (/H0)	hCE (m)	3,99	<<< to input
Height of center (m) of lateral area below the waterline when the boat is upright (/H0)	hLP (m)	0,469	
Height of waterline in loading condition (to put heel = 0 in Stab)	(m)	0,018	
<b>Data coming from the GZ Curve :</b>		<b>With Zg (m)</b>	<b>With Zg (m)</b>

Righting arm at 90°	GZ90° (m)	-0,049	0,000	
First occurring downflooding angle	PhiD (deg)	95	95	<<< to input
>> Righting arm at downflooding angle (Computed in Stab)	GZD (m)	0,287	0,238	
Angle of vanishing stability	AVS (deg)	124,3	120,0	
Area under the GZ curve up to AVS	AGZ (m.deg)	36,702	32,648	

<b>Computation of the STIX parameters</b>			
	LBS (m)	6,459	6,459
	FL	0,899	0,899
(0,75 – 1,25)	FDL	0,918	0,918
	FB	1,954	1,954
(0,75 – 1,25)	FBD	1,048	1,048
	FR	2,177	1,854
(0,5 – 1,5)	FKR	1,056	1,029
(0,4 – 1,5)	FIR	1,001	0,966
(0,5 – 1,0)	FWM	1,000	1,000
(0,5 – 1,5)	FDS	0,944	0,912
(0,5 – 1,25)	PDF	1,056	1,056
	<b>&gt;&gt; STIX</b>	<b>21,7</b>	<b>20,7</b>
	<b>&gt;&gt; AVS (°)</b>	<b>124,3</b>	<b>120,0</b>
<b>&gt;&gt;Righting Energy (m.deg.kg)</b>		<b>50 057</b>	<b>44 528</b>
	<b>Areas ratio</b>	<b>4,7</b>	<b>3,5</b>

Design category	To compare with :			
	Cat. A	Cat. B	Cat. C	Cat. D
STIX Lower limit	32	23,0	14,0	5
AVS (°) mini required	123,7	114,3	90,0	75
Righting energy (m.deg.kg) mini required	172 000	57 000		

>>> Here it is a classification in Cat. C : the STIX 21,7 is over 14,0 but lower than 23,0 for a classification in cat. B. The righting energy 48 551 is also too short for cat. B for which 57 000 required.