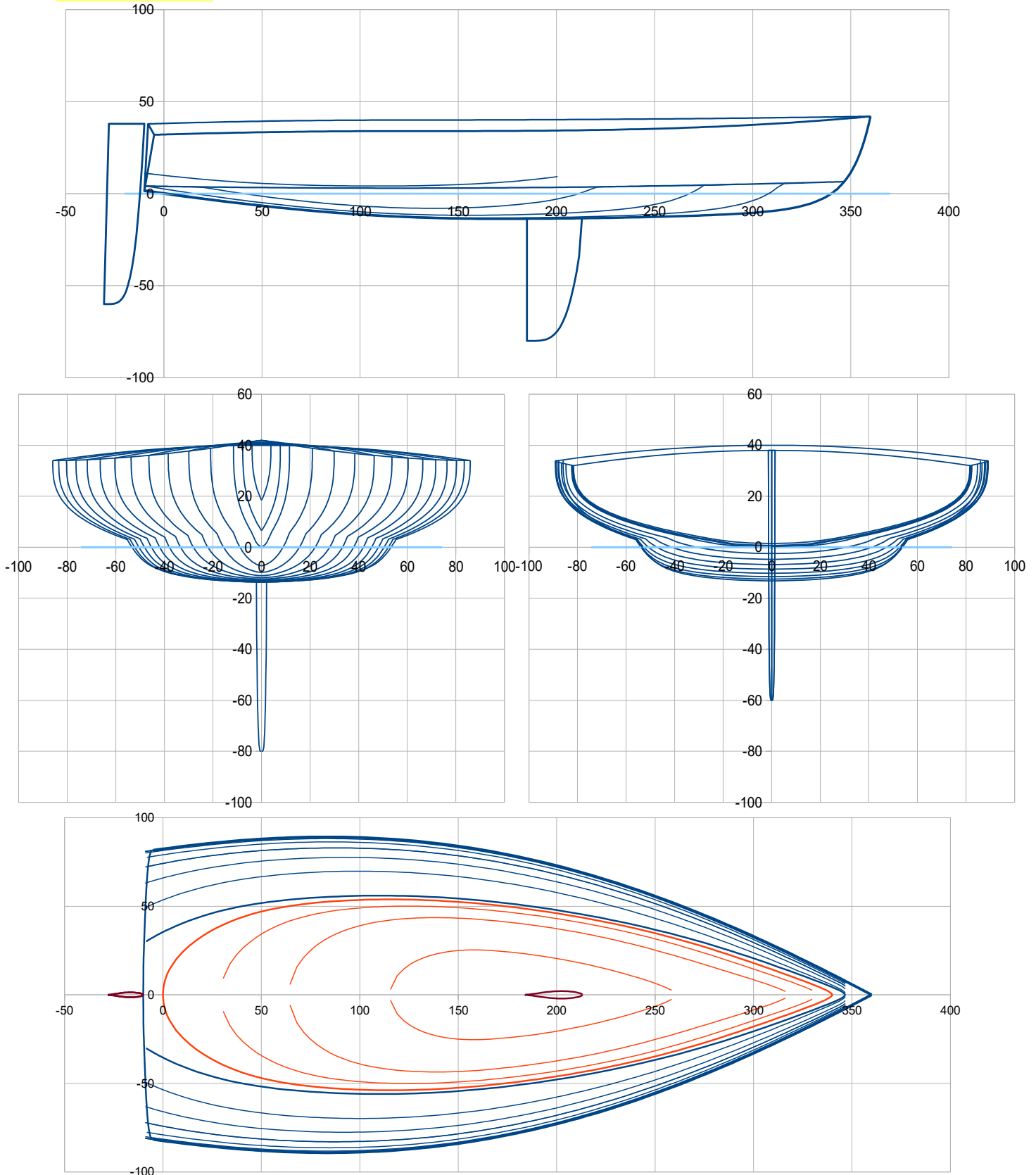


Dinghy for coastal expeditions – bi convex hull option, stability investigation and comparison

Loa : 3,70 m ; Lwl : 3,40 m ; B : 1,80 m ; Light weight (Hull + Rig + Sail fully equipped) : ~ 84 kg
(with same assumptions and mass units as previously)

>>> all other things equal (inc. the Bwl), **this bi-convex option** with $B_{oa} = 1,8$ m instead of 1,5m for the conventional U hull **leads to ~ 7 kg extra mass (+ 9% of the Light weight boat).**

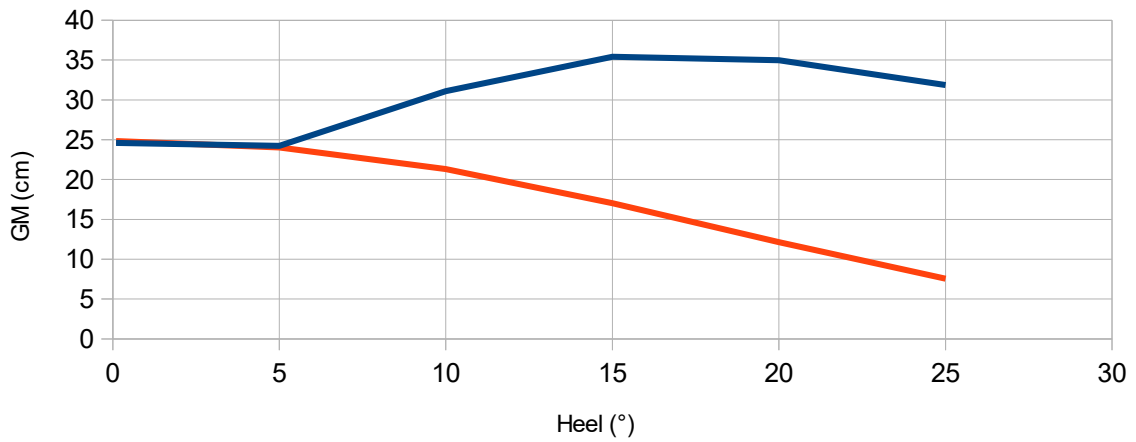
Hull 2D linesplan (with waterline H0 for 234 kg displacement, i.e. with 150 kg of payload) :



Stability with a payload of 2 crew/150 kg squatted in boat center at Z +52 cm (it is the tack or gybe configuration, when the 2 crew are squatted in the boat center to go under the boom).
 >>> metacentric center GM computation for heel up to 25° :

GM versus Heel

With 2 crew 150 kg squatted in boat center at Z + 52 cm
 Blue : bi-convex hull ; Red : U hull

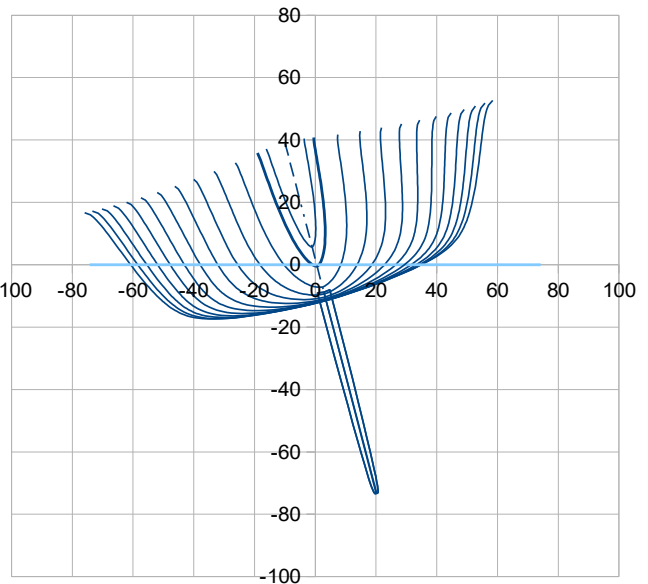
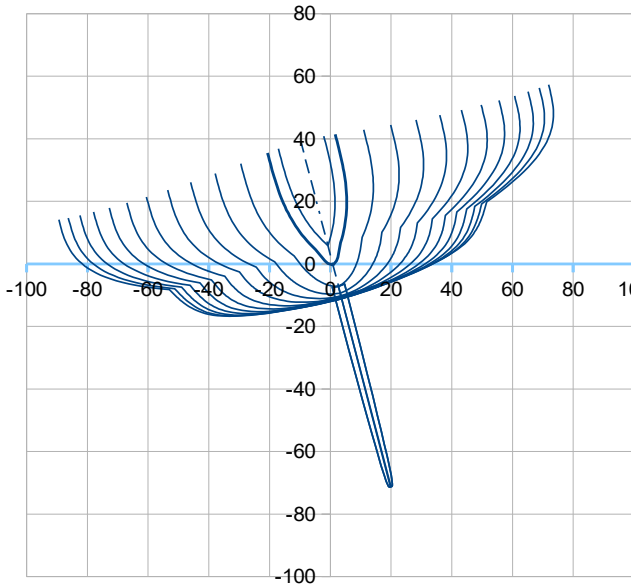


>>> From 5° heel angle, the hull extra volume gives more stability margin, at 15° the GM is twice.

Comparison at heel 15° :

GM_{15°} = 35,4 cm

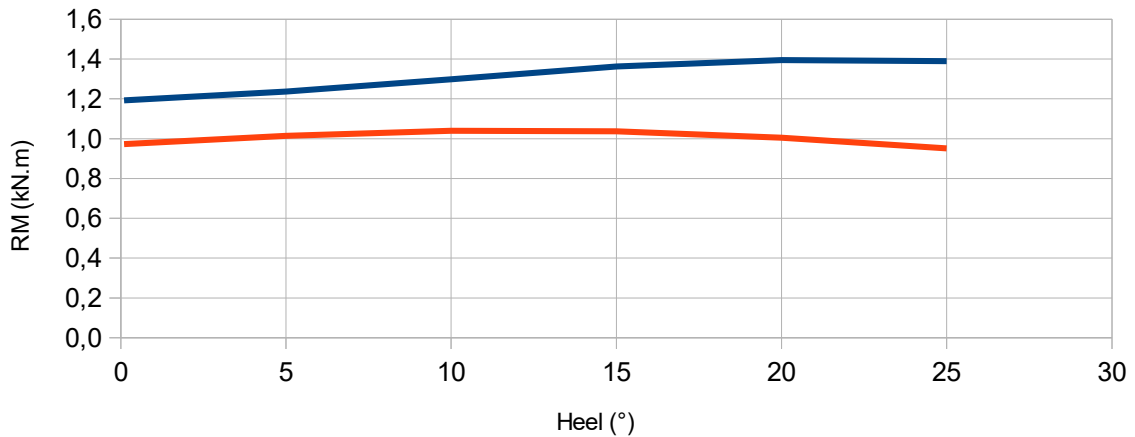
GM_{15°} = 17,0 cm



Righting moment with a payload of 2 crew/150 kg just sit windward at Z +52 cm and Y depending of the boat beam : Y(crew) 81 cm for the bi-convex hull, Y(crew) 66 cm for the U hull.

Righting moment RM versus heel

With 2 crew 150 kg sit windward
Blue : bi-convex hull ; Red : U hull

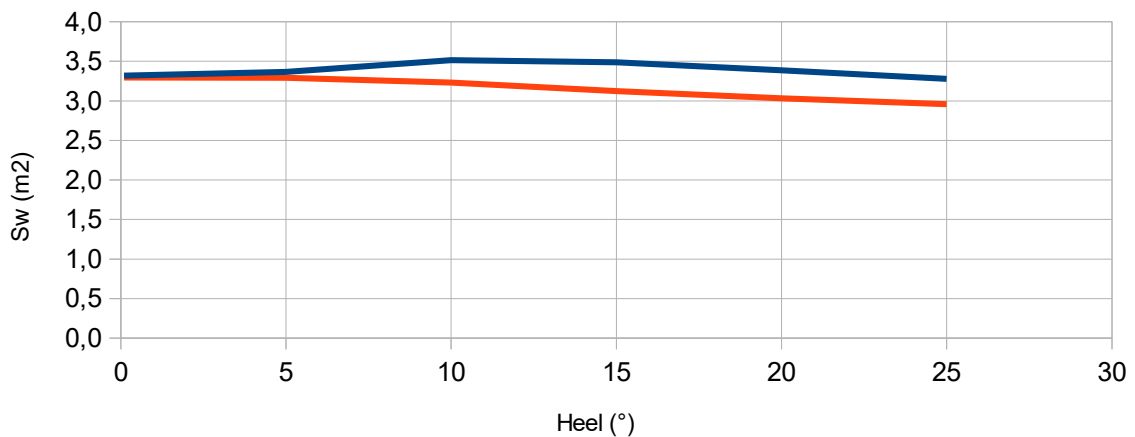


>>> the bi-convex hull lead to :

- +20% more RM in the usual sailing range of heel (0° to 5°)
- +40% more RM in case of gust of wind with overheel at 20°

Wetted surface Sw versus heel

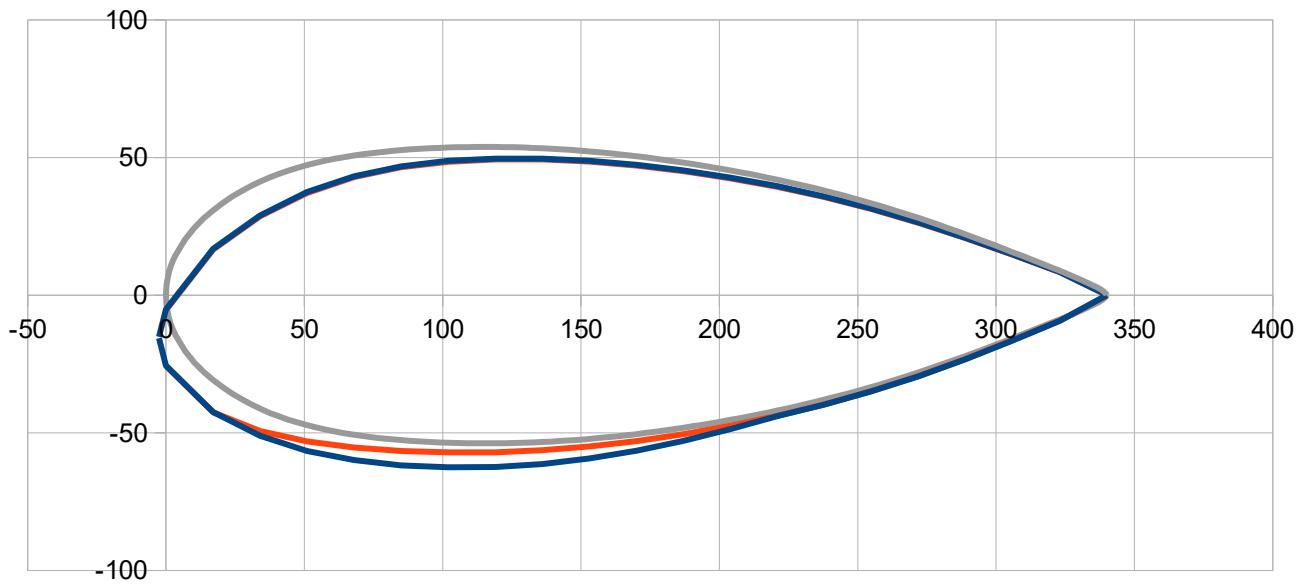
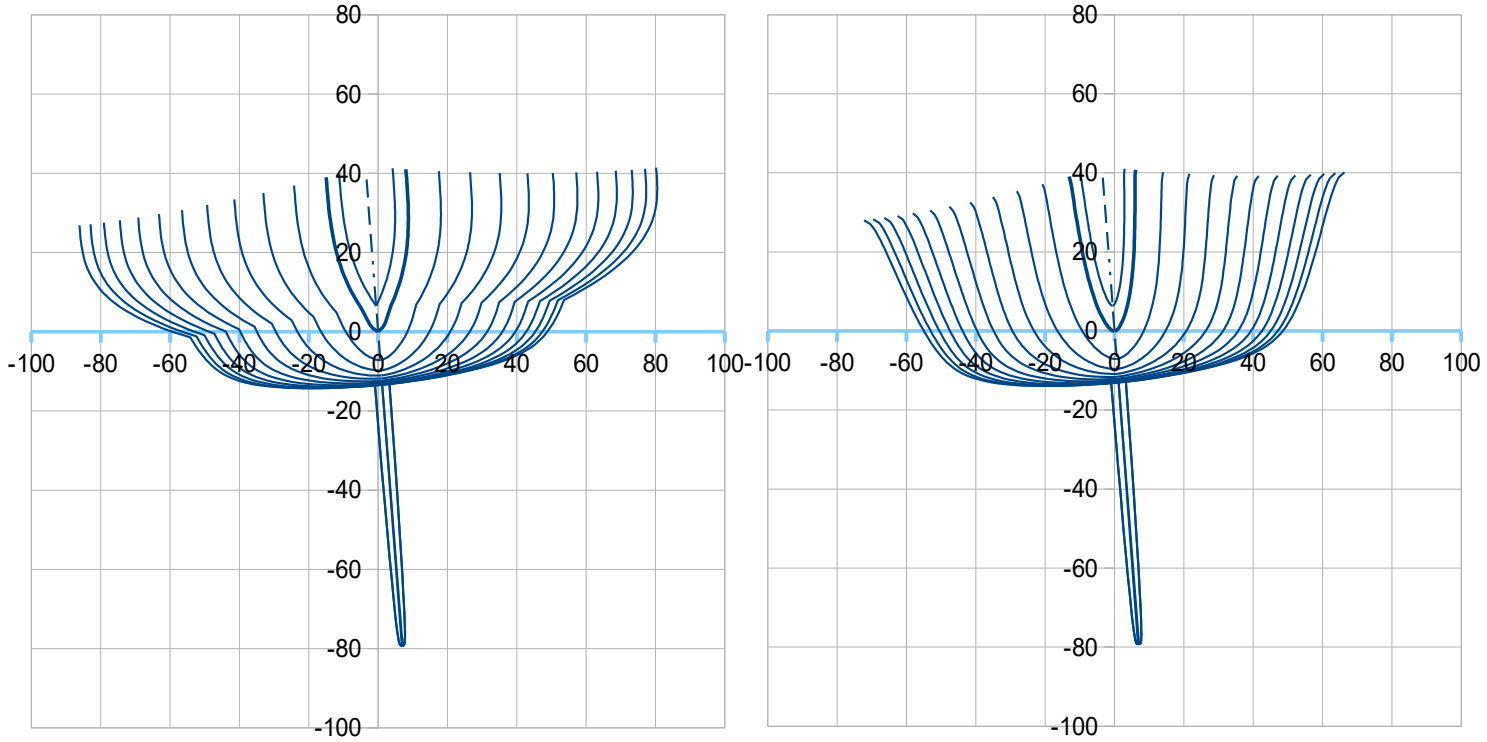
With 2 crew 150 kg sit windward
Blue : bi-convex hull ; Red : U hull



>>> the bi-convex hull lead to :

- same wetted surface Sw (and Bwl) in the usual sailing range of heel (0° to 5°)
- +12% more Sw (and more Bwl) in case of gust of wind with overheel at 20°

Beam waterline and floatation shapes are equivalent up to 5° heel :



Floatation shapes at 15° heel are different, the leeward line especially :

(Blue : Bi-convex hull ; Red : U hull)

