

# Comparison of original and modified common grids in Test Case 5

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## Secretariat of CFD Workshop TOKYO 2005

In Test Case5, we provided 5 different density grids around KVLCC2M. Some attendants had already computed the flows using the common grids. On December 8, Dr.Deng of Ecole Cenrale de Nantes kindly pointed out that pressure oscillations were seen on the hull surface near the z-symmetry plane. In addition, he traced its origin and found that it is due to the fact that grid points are not projected properly to the hull surface. We also checked the grid quality and came to the same conclusion.

Consequently, we reprojected the 5 old grids to the hull surface and regenerated 5 modified grids, although we trouble the attendants so much. Following are the comparison of original and modified grids.

Figure 1 shows the comparison of half-breadth distributions on a water plane of original and modified common grids. Discrepancies can be clearly seen. In Fig.2, pressure oscillations are observed around  $x=-0.4$  particularly for the original Grid2 and Grid4. However, the  $C_p$  distributions of the modified grids show the smooth results as shown in Figure 3. Similar comparison was conducted in Fig.4 and 5 for the keel line. In this case, the differences between the original and modified grids are very small.

Finally, pressure distributions on the hull were compared from Fig.6-15. The oscillations observed in the original Grid2 and Grid 4 completely disappear for the modified Grid2M and Grid4M. From these results, modified grids are found to be improved well.

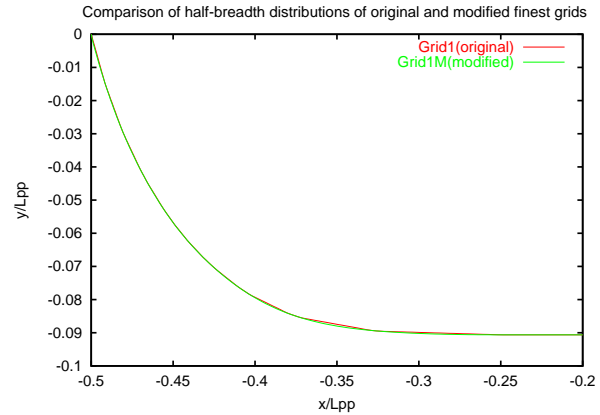


Fig.1: Comparison of original and modified half-breadth distributions on water plane.

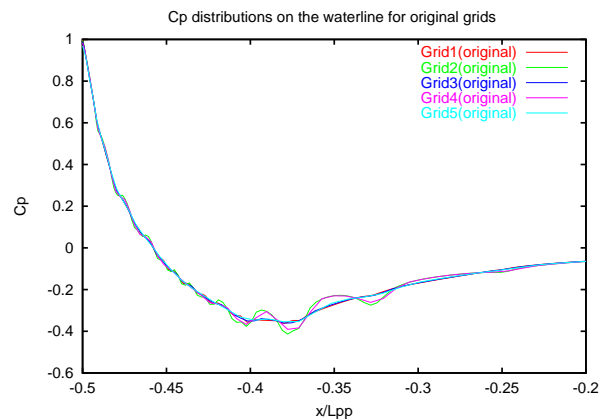


Fig.2:  $C_p$  distributions on the waterline for original grids.

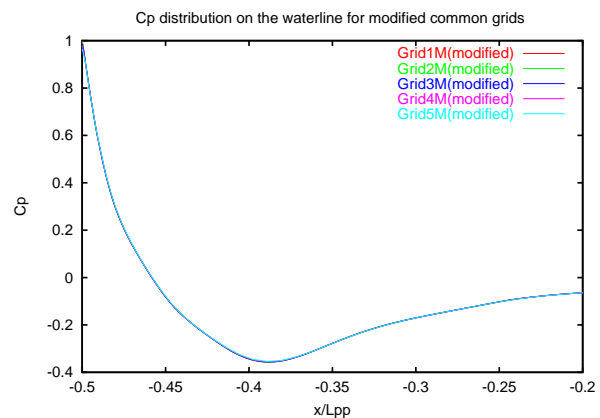


Fig.3:  $C_p$  distributions on the wateline for modified grids.

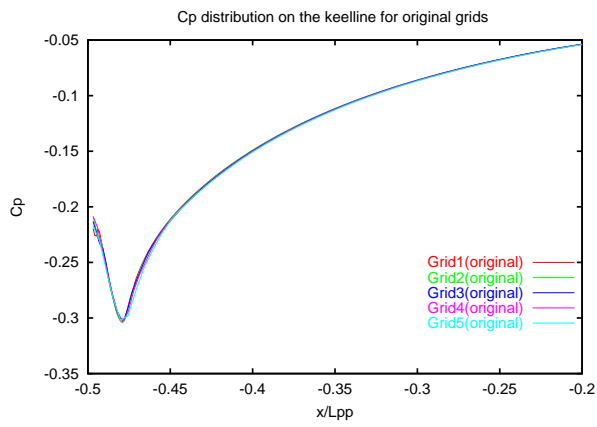


Fig.4: Cp distributions on the keelline for original grids.

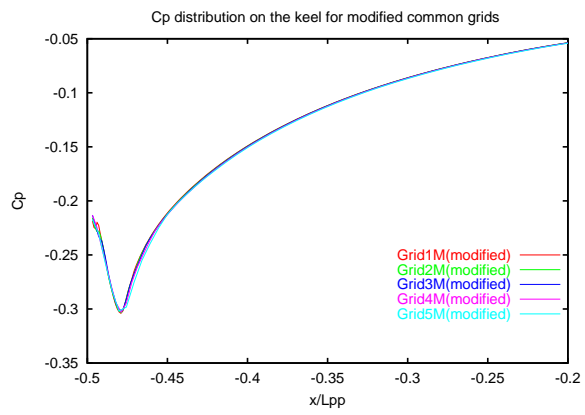


Fig.5: Cp distributions on the keelline for modified grids.

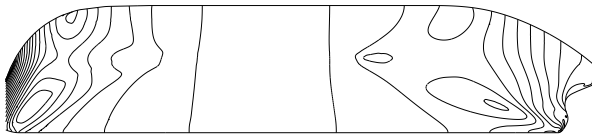


Fig.6: Cp contour maps on hull for original Grid1 ( $\Delta Cp = 0.05$ ).

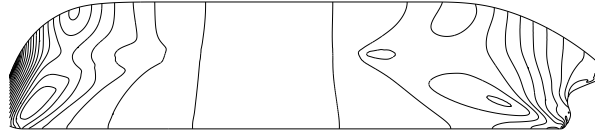


Fig.11: Cp contour maps on hull for modified Grid1M ( $\Delta Cp = 0.05$ ).

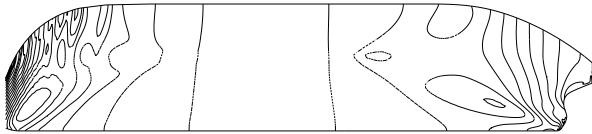


Fig.7: Cp contour maps on hull for original Grid2 ( $\Delta Cp = 0.05$ ).

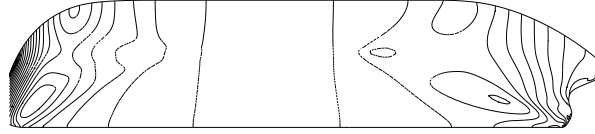


Fig.12: Cp contour maps on hull for modified Grid2M ( $\Delta Cp = 0.05$ ).

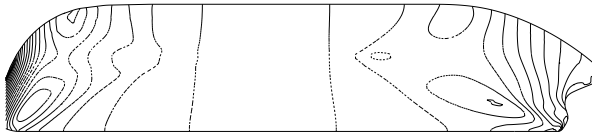


Fig.8: Cp contour maps on hull for original Grid3 ( $\Delta Cp = 0.05$ ).

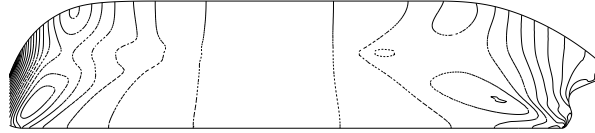


Fig.13: Cp contour maps on hull for modified Grid3M ( $\Delta Cp = 0.05$ ).



Fig.9: Cp contour maps on hull for original Grid4 ( $\Delta Cp = 0.05$ ).

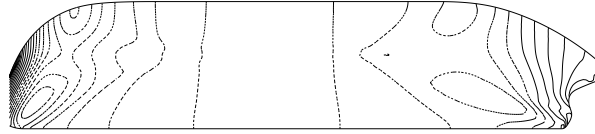


Fig.14: Cp contour maps on hull for modified Grid4M ( $\Delta Cp = 0.05$ ).

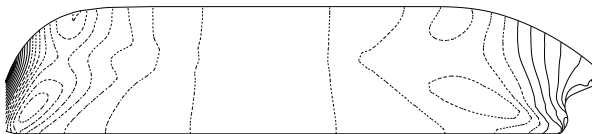


Fig.10: Cp contour maps on hull for original Grid5 ( $\Delta Cp = 0.05$ ).

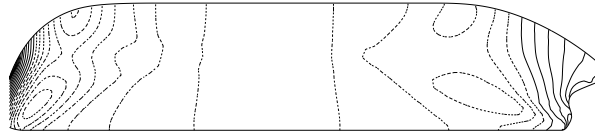


Fig.15: Cp contour maps on hull for modified Grid5M ( $\Delta Cp = 0.05$ ).