

## ***Interactive comment on “VISIR-I: small vessels, least-time nautical routes using wave forecasts” by G. Mannarini et al.***

### **Anonymous Referee #1**

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The paper targets an approach to optimal routing in rough seas, considering various constraints with regard to feasibility and safety. The work seems well organized and the authors have done a good job in identifying the major issues involved as well as presented an algorithm for the solution.

However, being a naval architect myself, I render the hydrodynamic ship model as presented here suitable for a 'proof of concept' study only. The assumptions considered in simplification will necessarily lead to huge deviations for real ships and thus lead to wrong results.

A few more detailed comments: P7926, eq 16: The common convention in fluid dynamics is that a resistance is always a component opposite of the motion, therefore multiplication of  $R_a$  with cosine ( $\alpha$ ) is not reasonable. However,  $R_a$  depends on

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the encounter frequency, wave height, wave encounter angle (and more). The multiplication with cosine (alpha) would imply a "thrust force" for alpha=180 which is not reasonable.

P7927, eq 18: Taking  $C_t$  as constant is a very crude approximation as this will neglect all effects of wave making (CR) which especially for smaller sized vessels (as proposed here) has a significant value and changes the resistance curve to be more like a polynomial of the order of 3 or 4 rather than 2 as proposed here. There are various simplified calculation methods available that (even though not being exact) at least consider the general trend of the resistance more appropriately. Please check for Holtrop & von Mennen for a 'standard procedure' which perhaps would be better suited for a proof of concept study.

The criteria for stability, parametric rolling etc, are of course important to consider, however, as these all depend to a large extent on the specific hull shape and weight distribution the derived approximations seem to be too crude for providing relevant results for technical application.

It shall be noted, that this topic is not so new and has been approached before, see e.g. [http://www.researchgate.net/publication/237717485\\_Pareto\\_Optimal\\_Routing\\_of\\_Ships](http://www.researchgate.net/publication/237717485_Pareto_Optimal_Routing_of_Ships)

There are also several commercial providers of such service available, in fact almost all weather data providers e.g. AWT, which are used in ocean shipping on a regular basis. However, these services typically also include crude models of the hydrodynamics, only, since details of the specific ship are not available so there are still improvements possible. I would encourage the authors to point out how the described procedure improves the algorithms used in commercial shipping.

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Interactive comment on Geosci. Model Dev. Discuss., 8, 7911, 2015.

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