Firstly the language should be proofread and improved. The article will benefit from clear and precise language.

Proofreading was done.

Purpose and discussion:

What are the main factors affecting fuel consumption? How does your article fit into these? For example, How would slow steaming affect safety and fuel consumption? What about overall route optimization in comparison to trajectory planning?

Slow steaming is widely used nowadays, particularly in the liner shipping, where schedules are well established in the long notice. However, it happens very often, that there is a need to proceed at full speed to adjust some delays. In tramping, schedules are not so often, while slow steaming as well. Authors fully agree that slow steaming reduces fuel consumption. However would like to underline, that the highest priority was given to safety. This factor was underlined in assumptions. From the safety perspective, course alteration is considered as faster and better visible for others also for the radar.

Authors fully agree that overall route optimization should give better results. However, their area of interest is focused now on collision avoidance system, while the overall optimization is the next step.

Is weather-optimized routing, not a more efficient tool for the overall voyage plan, to save fuel? How much do you expect to save in comparison to such an approach? Or at least compare the benefits.

Route planning is usually divided into two parts. The strategic part is related to weather-optimised routing. The tactical part is connected with collision avoidance. The tactical part is executed as an element of the strategic part. The experiment presented in the article is focused on the tactical part of route planning.

The planning and calculation of the algorithm were mentioned as being 2 seconds, could you provide a reference value on how much time will be available to avoid a collision?

The average execution time of the single BSA call was less than 0.1 of a second. The BSA algorithm is called on about every 10 seconds because at least every 10 seconds current data from AIS is downloaded. The referenced value 2 seconds mentioned in the Introduction concerns on the Lazarowska algorithm [7].

In the experiment, the Phase 1 limit was set as 8 Nm. It means that vessels further than 8 Nm are not taken into account when calculating a collision avoiding manoeuvre. In a theoretical situation, when two vessels are in a head-on situation and both are proceeding at 25 knots, the distance of 8 Nm will be covered within 9 minutes. This is probably the shortest available time to avoid a collision.
In the discussion:

How will the results be affected if the COLREGs are considered? Will the calculated route be different from the NAVDEC route? What leads you to the claim that the routes are safe when they violate the COLREGs and be potentially misinterpreted.

Observing the COLREGs forces vessels to alter course to starboard when they are a give-way vessel. Even a small deviation to port can be treated as a violation of the COLREGs. This is why some of the solutions, which are the shortest, do not comply with the COLREGs. The goal of this paper is to show that it is possible to fulfill the safe distance criteria and make the route significantly shorter. Only two solutions advise the alteration to port, but that presented in Fig. 9 cannot be treated as a COLREGs violation. In a head-on situation presented there, when TCPA is shorter than 5 minutes, altering course to starboard will lead to a very dangerous situation. Even the NAVDEC suggested an alteration to port as it was difficult or even impossible to maintain a safe distance when turning to starboard. Summarizing in the 14 cases, there is one violation. Even if it is excluded from the results, there is still a significant distance saving in comparison to the NAVDEC.

How do your assumptions that are presented in sections 2 and 3 (Which are very well presented) affect your results?

The results were also affected by other assumptions than those mentioned above. The distance between two waypoints does not allow for frequent course alterations, which are practically not feasible for the vessel. The assumption of the maximum course alteration also excluded some possible solutions. This was done on purpose, as significant course alterations significantly reduce vessel speed. Even a small alteration has an influence on speed. In the case of m/f Wolin, changes by 30 degrees do not influence the passage time. They reduce the speed, but, at the same time, the route is also shortened, as the vessel does not precisely pass the waypoint, starting the turn before reaching the waypoint and reaching a new leg after the waypoint. Ultimately, the shortcut makes speed reduction not important.

Simulations presented in this article or further work should be carried out that include a reactive target ship model to test this?

We do used a reactive target ship models in our works. The example is here:

https://drive.google.com/file/d/1UA5ktnTjoOUHdh3smF1rLS0Zud5IkH3W/view

We will summary these works in the next articles.
NAVDEC - NAVigation DECision Support System is developed by Sup4Nav, a spin-out company of the Maritime University of Szczecin. The short introduction, how it works is here:

https://www.youtube.com/watch?v=SMN77IUZtg&t=75s

NAVDEC is already a commercial system


The main settings, which can be adjusted, except COLREGs, are:

1. CPA
2. approach stages, which actually come from COLREGs

For example, Phase 1 is described as follows:
Phase 1. This phase refers to the case when the relative course of the target intersects safety domain of own ship, but the ships are at such a distance that collision regulations do not apply yet. According to COLREGs we cannot say yet that there is a risk of collision. However we can plan future maneuvers when rules apply.