CODECHECK certificate 2024-017

https://doi.org/10.5281/zenodo.14211707

Item	Value
Title	Determination of a diffusion coefficient function for long rooms using a least square optimization approach
Authors	Ilaria Fichera , Cédric Van hoorickx , Maarten Hornikx
Reference	https://pure.tue.nl/ws/portalfiles/portal/339520759/IN_2024_3491.pdf
Codechecker	Stephen J. Eglen , Dingding Xie, Huiqing Wang, Mareike Wendelmuth
Date of check	2024-11-22 10:00:00
Summary	This project was a collection of python scripts for computation, together with some Matlab for computation.
Repository	https://github.com/codecheckers/Inter_Noise2024_Codes_Acoustics_Diffusion_Equation

Table 1: CODECHECK summary

Summary

This codecheck happened in two parts; the first part was as part of the Delft workshop in May 2024. The author was present whilst several participants worked on the project. There were some initial issues around operating system compatibility (e.g. path separators), but these were fixed during the workshop.

After the workshop, one of us (SJE) worked on repeating the work and writing this up.

Our conclusion is that work is clearly reproducible.

Output	Comment	Size (b)
codecheck/figs/codecheck-fig1a.png	manuscript Figure 1a	22830
codecheck/figs/codecheck-fig1b.png	manuscript Figure 1b	27716
codecheck/figs/codecheck-fig2b.png	manuscript Figure 2b	21747
codecheck/figs/codecheck-fig3a.png	manuscript Figure 3a	25813
codecheck/figs/codecheck-fig3b.png	manuscript Figure 3b	25813
codecheck/figs/codecheck-fig3c.png	manuscript Figure 3c	33180
codecheck/figs/codecheck-fig4a.png	manuscript Figure 4a	22982
codecheck/figs/codecheck-fig4b.png	manuscript Figure 4b	22244
codecheck/figs/codecheck-fig4c.png	manuscript Figure 4c	23285
codecheck/figs/codecheck-fig5b.png	manuscript Figure 5b	23950
codecheck/figs/codecheck-fig5c.png	manuscript Figure 5c	25070
codecheck/figs/codecheck-fig7a.png	manuscript Figure 7a	21576
codecheck/figs/codecheck-fig7b.png	manuscript Figure 7b	21336
codecheck/figs/codecheck-fig7c.png	manuscript Figure 7c	25885

Table 2: Summary of output files generated

CODECHECKER notes

This project was written mostly in python, with some matlab for plotting purposes. The project README was mostly clear to follow, although discussions with the author helped to clarify that the only file that needs to contain data is ROOT/results_rad_imp with the other two folders (ROOT/results_diff_imp and ROOT/results_opt_imp) starting as empty directories.

Installation

Matlab 2024b was available; we needed to install the npy-matlab package

```
cd ~/proj/2020/codecheckers/Inter_Noise2024_Codes_Acoustics_Diffusion_Equation

gh repo clone kwikteam/npy-matlab

start matlab and then

addpath('/Users/stephen/proj/2020/codecheckers/Inter_Noise2024_Codes_Acoustics_Diffusion_Equation/npy-ma
savepath
```

Running

Perhaps the most challenging thing was to work out how to make the parameter settings required to generate each figure. The approach herer was to come up with a set of versions of the original script ROOT/1-DiffEq3D.py for each folder. These are stored in the codecheck folder and titled 1-DiffEq3d-runN.py where N represents the run number. In the codecheck folder, there is also a shell-script that runs all the steps required for each figure. For example codecheck/run1.sh will run all the steps for the first run.

Run	To generate which figures	Approximate time
1	Figure 1	5 minutes
2	Figure 2, 5	15 minutes
3	Figure 3	2 minutes
4	Figure 4	15 minutes
5	Figure 7	15 minutes

The run-times are approximate; figure 3 was the smallest room, so was quickest to run. Run 1 was simpler as it didn't require the optimization steps (as noted in the README).

Reproducibilility

We managed to reproduce all the figures from the paper. There are some trivial differences (e.g. axis labels, some titles) which are presumably accounted for interactive editing of the figures, rather than anything substantial. Issues with figure labels aside, the only noticeable difference observed was that the solid line in Figure 1a is around 87.4 in the manuscript versus our value here of around 87.8; this was presumably a small difference in some settings and not a concern.

Figures 6 and 8

Figures 6 and 8 were reproducible from the matlab code, although it is worth clarifying that these figures used the data files that were provided in the author's repository, rather than using the versions that generated by the codechecker. Given that other figures could be reproduced, there is no reason to doubt that the data underlying fig 6 and 8 is reproducible.

Recommendations

We suggest to the authors to consider the following suggestions for their next publication or workflow:

Separate out parameters from the scripts

Various settings for the program (e.g. lines 33-46) needed to be change to generate the different figures. Consider whether the parameters could be set in their own file, separate from other elements. This would make it easier for running your work under different conditions.

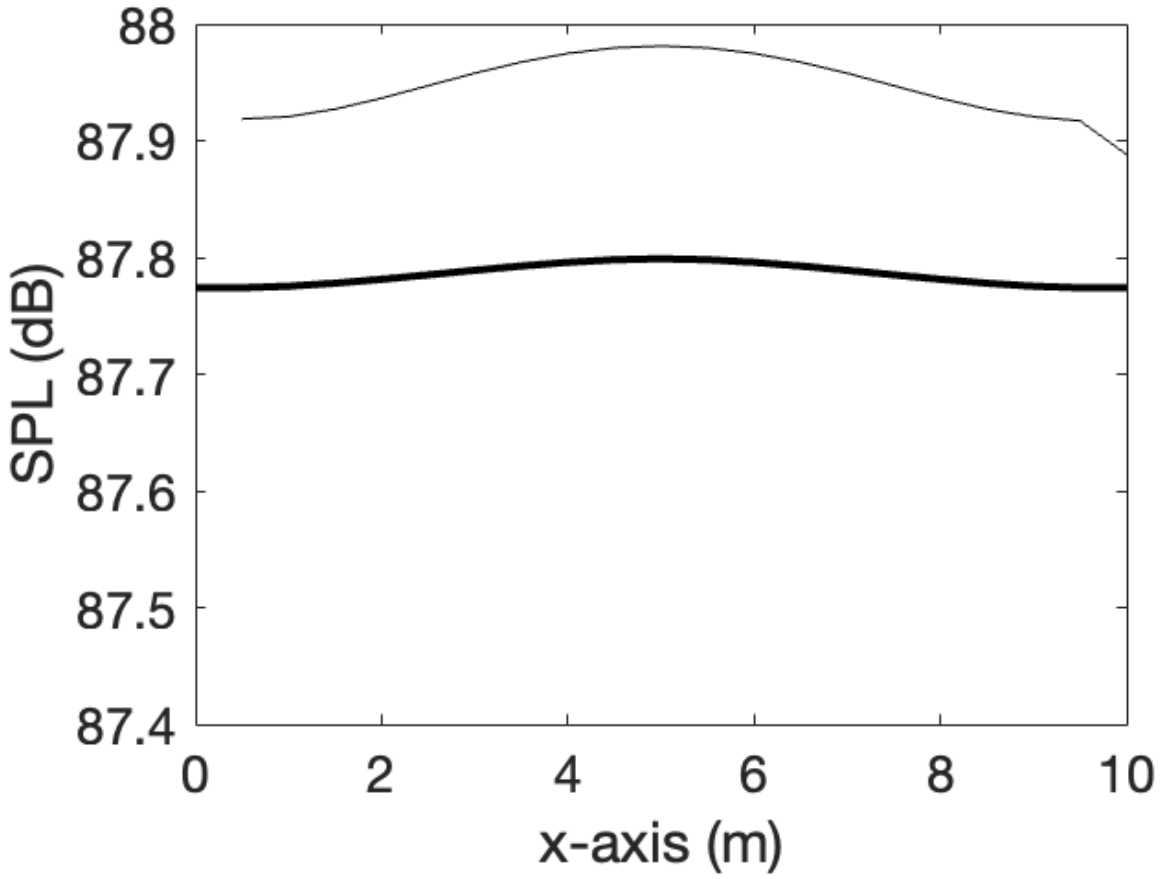
Matlab dependency

Whilst there is nothing wrong with matlab, the workflow would have been slightly easier had all the plotting been done in Python, rather than matlab.

Manifest files

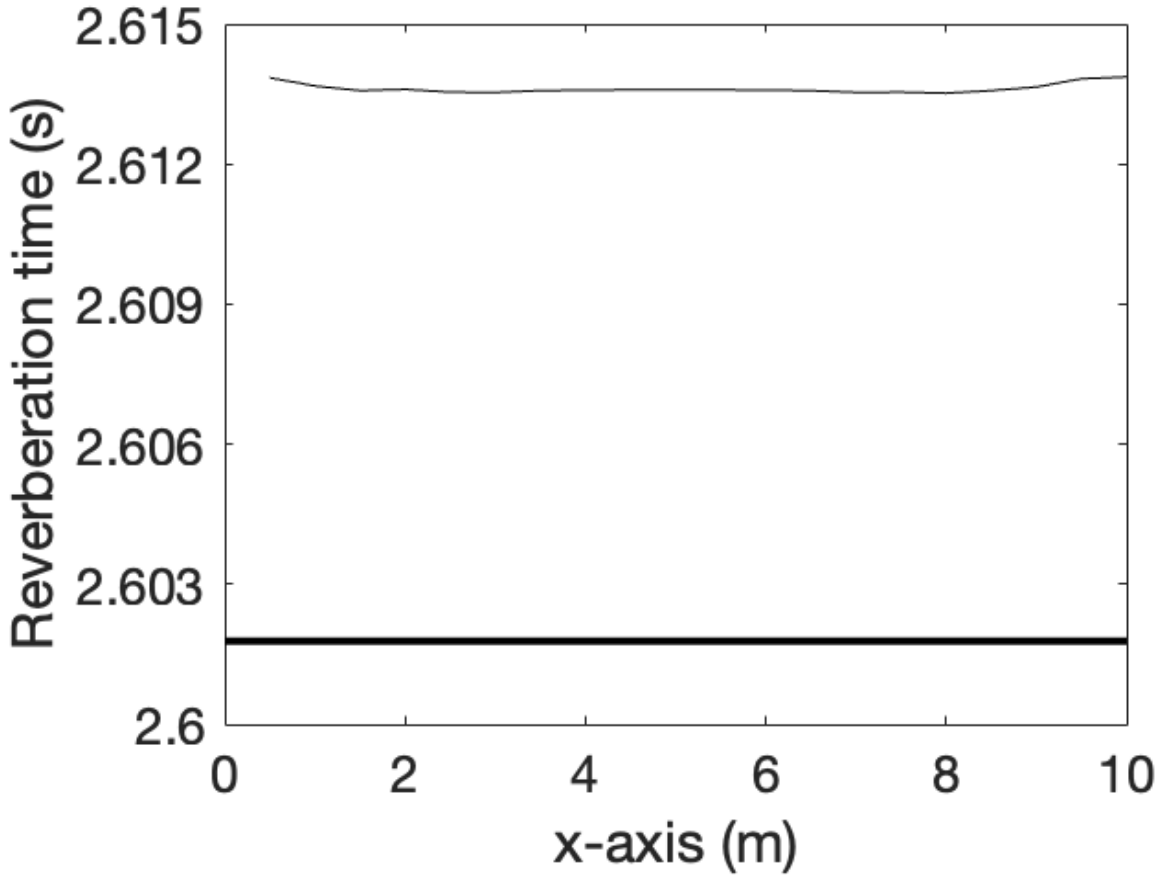
codecheck-fig1a.png

Comment: manuscript Figure 1a



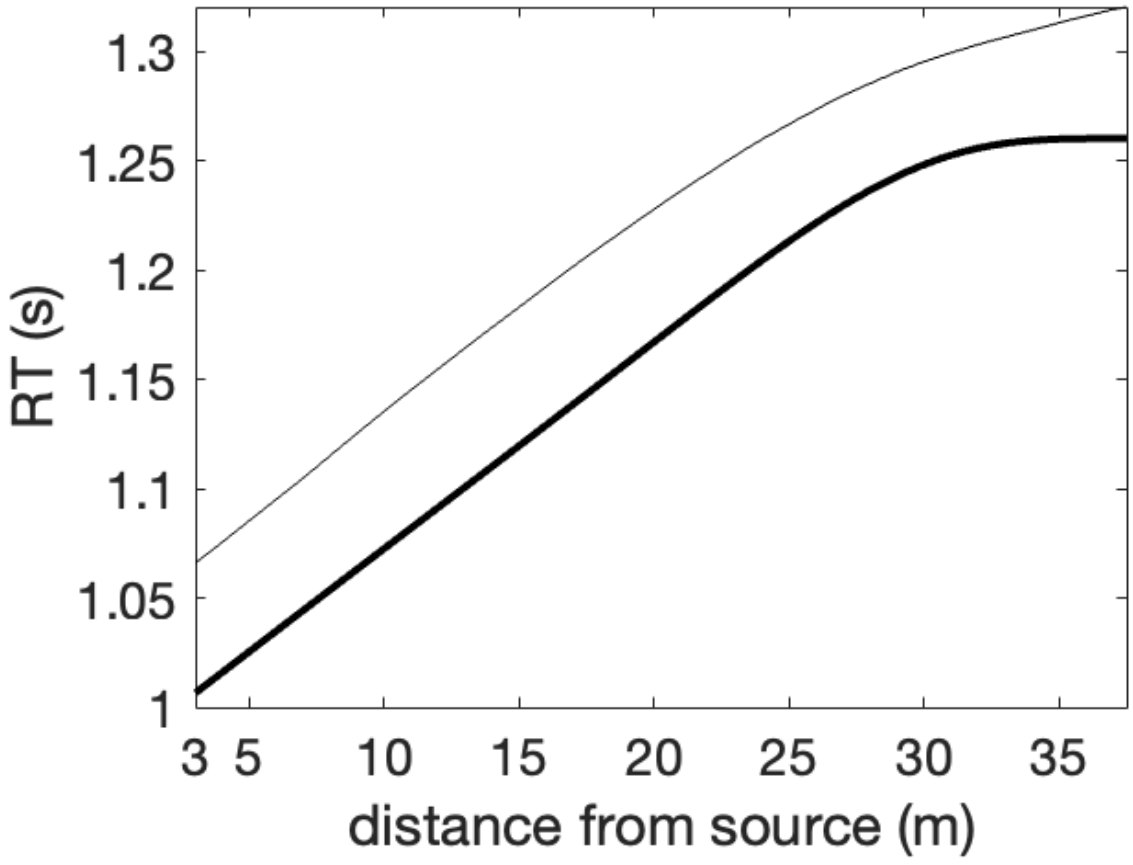
codecheck-fig1b.png

Comment: manuscript Figure 1b



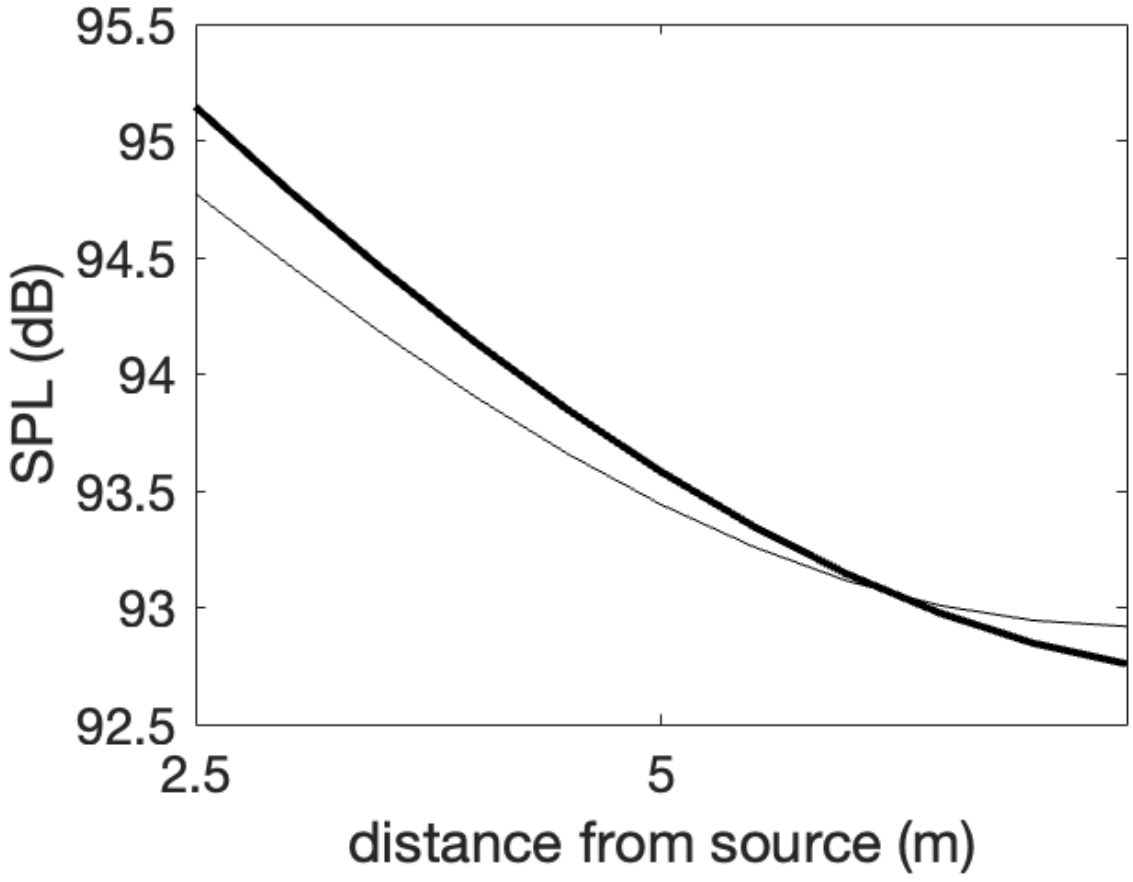
codecheck-fig2b.png

Comment: manuscript Figure 2b



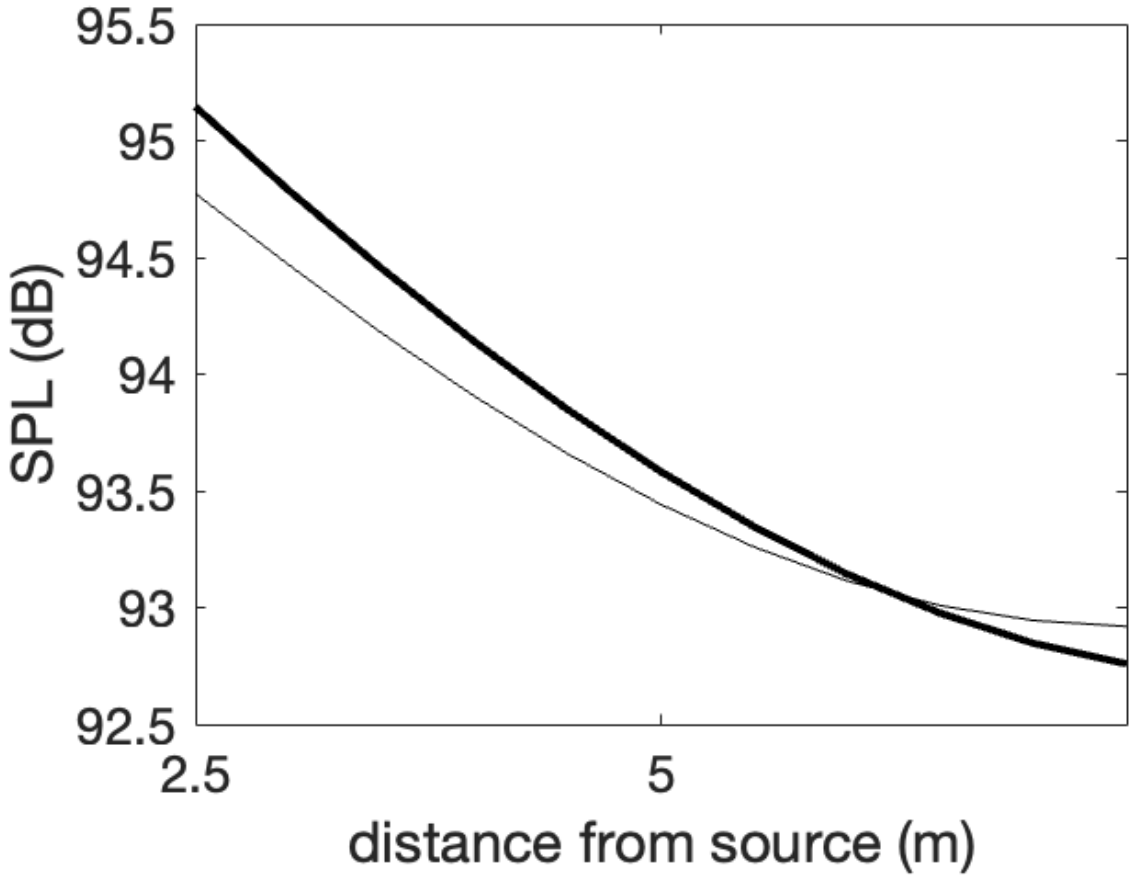
codecheck-fig3a.png

Comment: manuscript Figure 3a



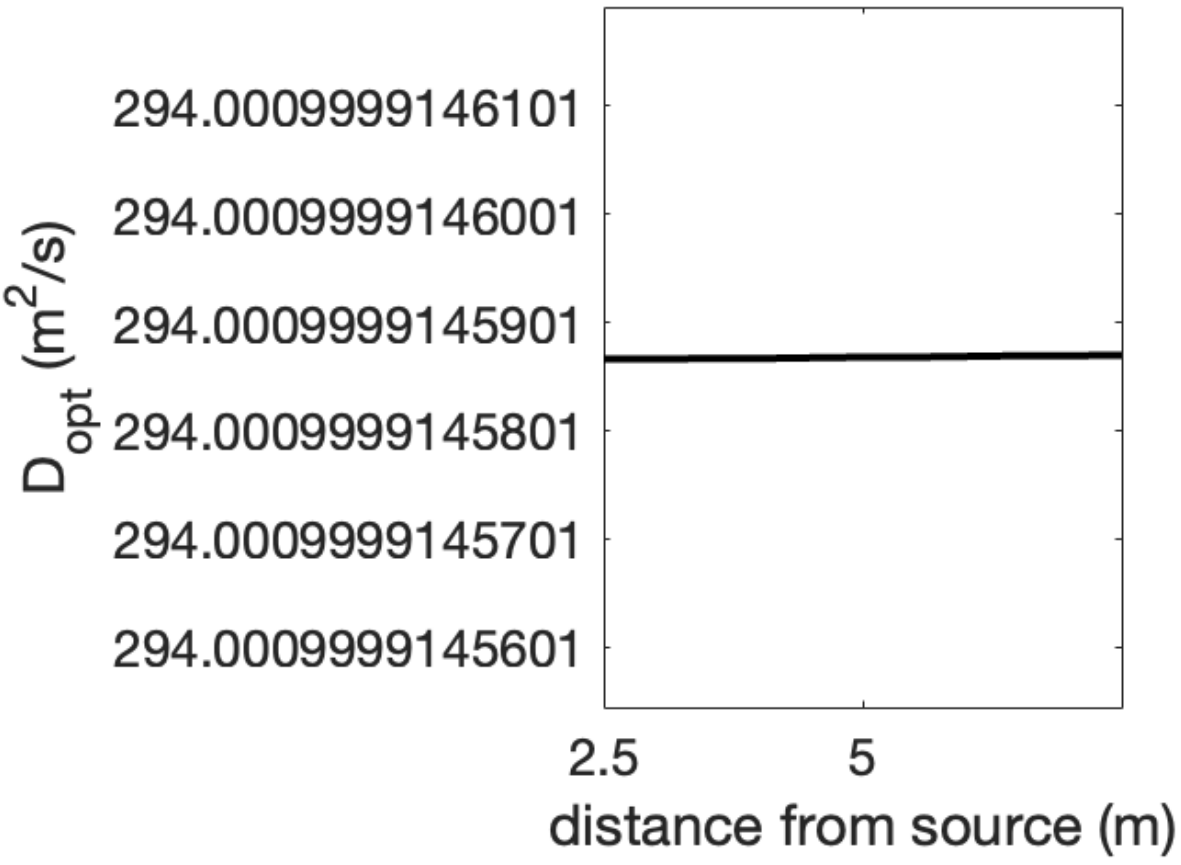
codecheck-fig3b.png

Comment: manuscript Figure 3b



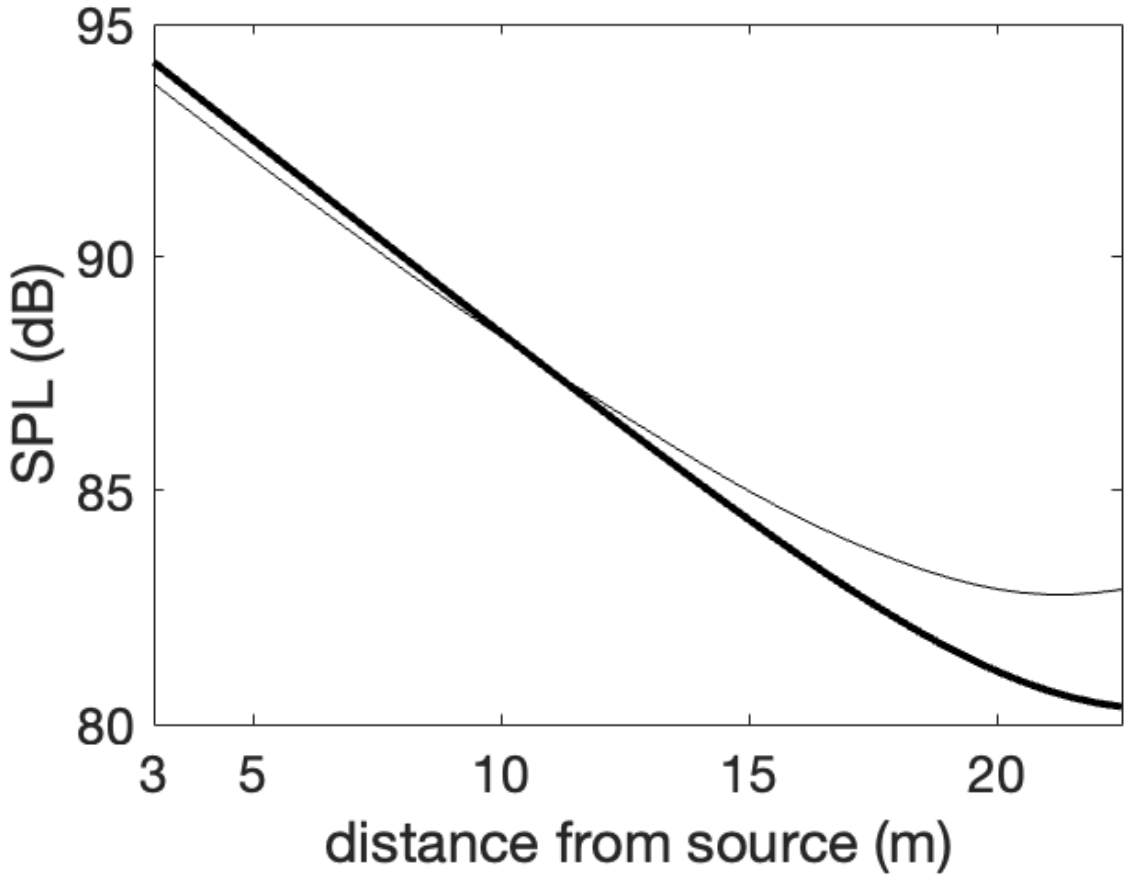
codecheck-fig3c.png

Comment: manuscript Figure 3c



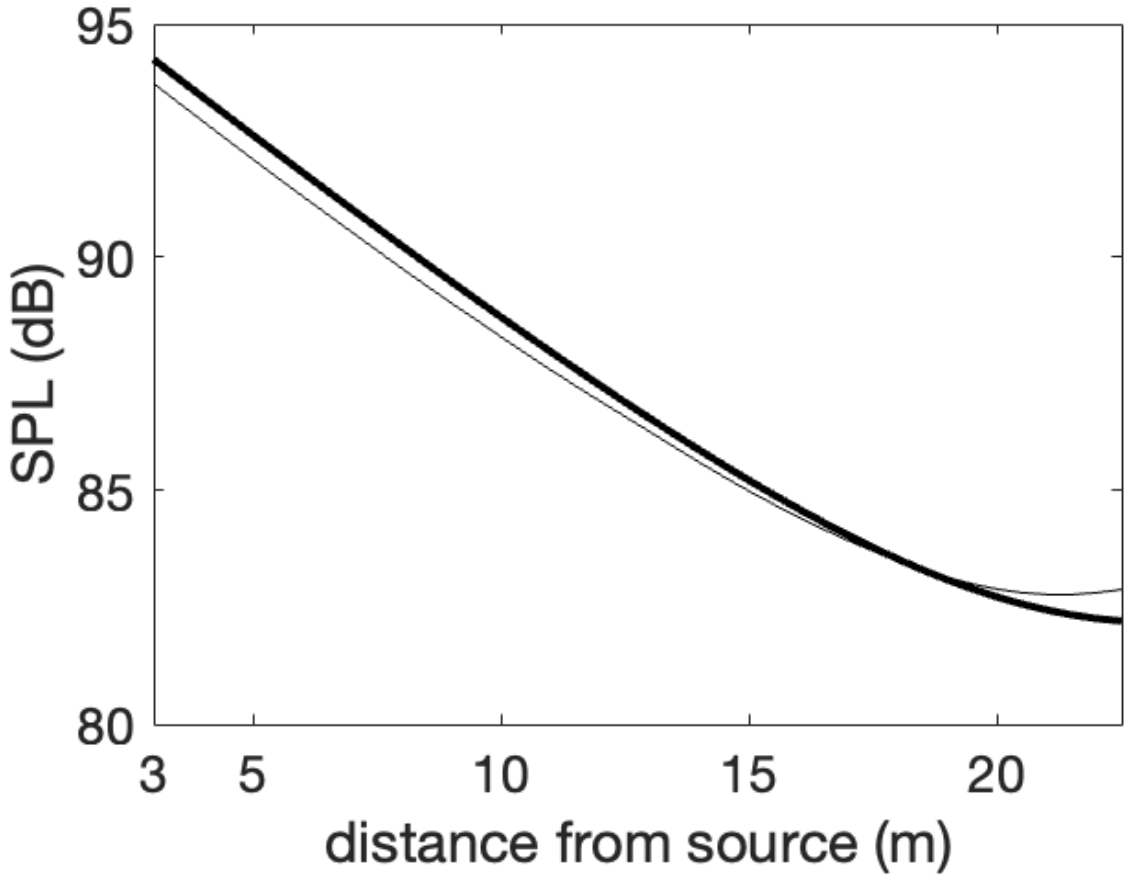
codecheck-fig4a.png

Comment: manuscript Figure 4a



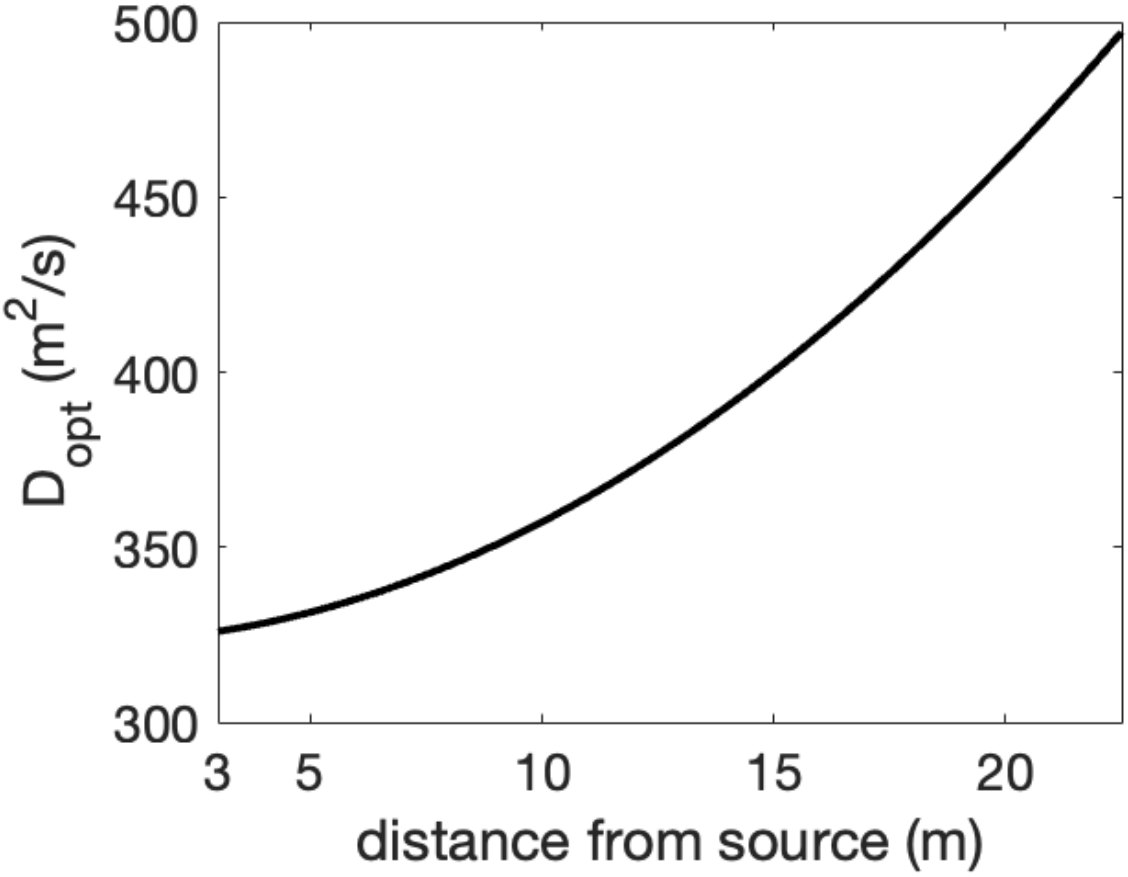
codecheck-fig4b.png

Comment: manuscript Figure 4b



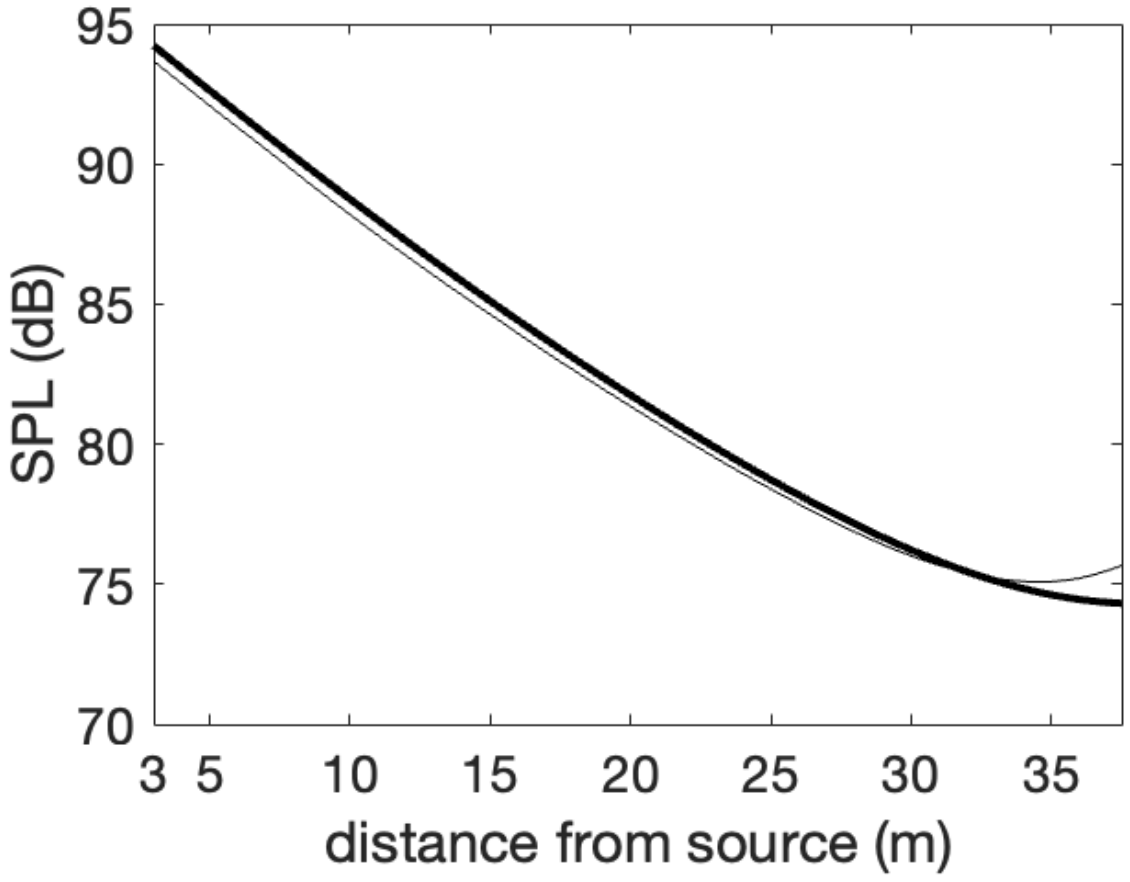
codecheck-fig4c.png

Comment: manuscript Figure 4c



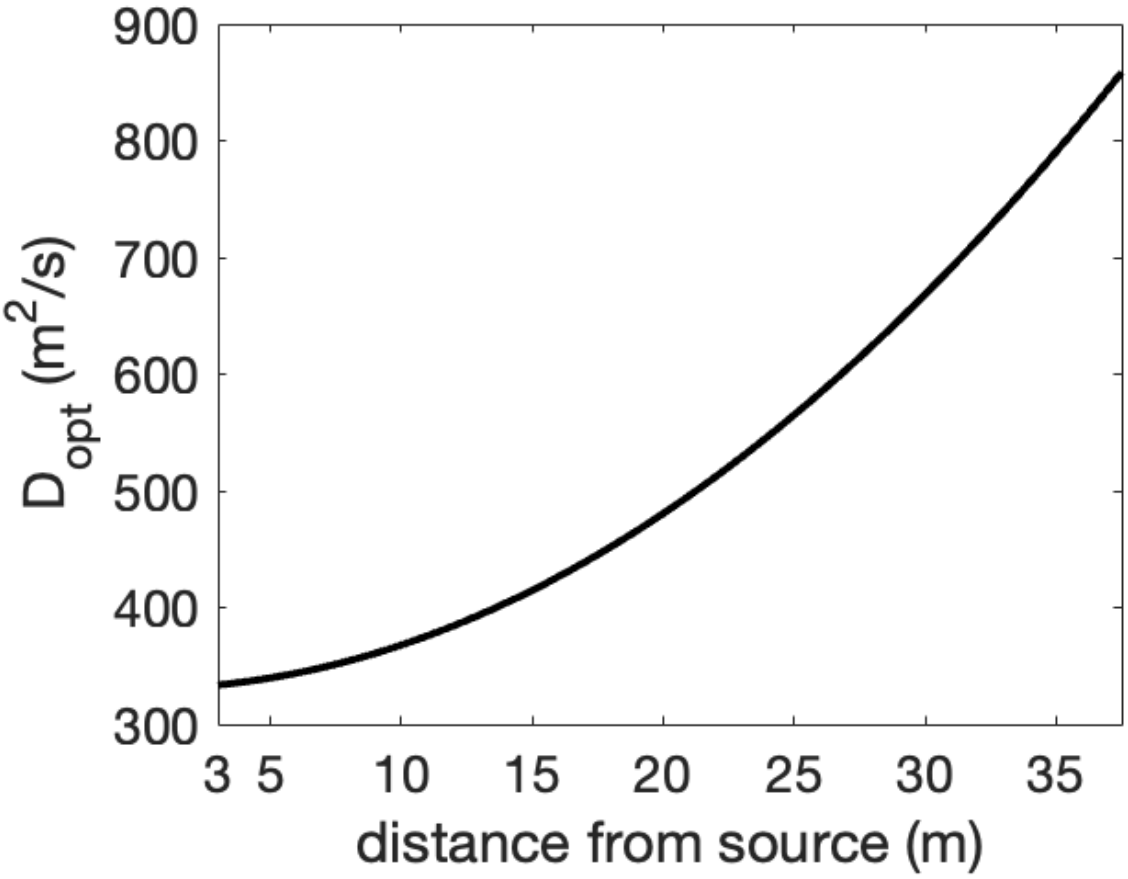
codecheck-fig5b.png

Comment: manuscript Figure 5b



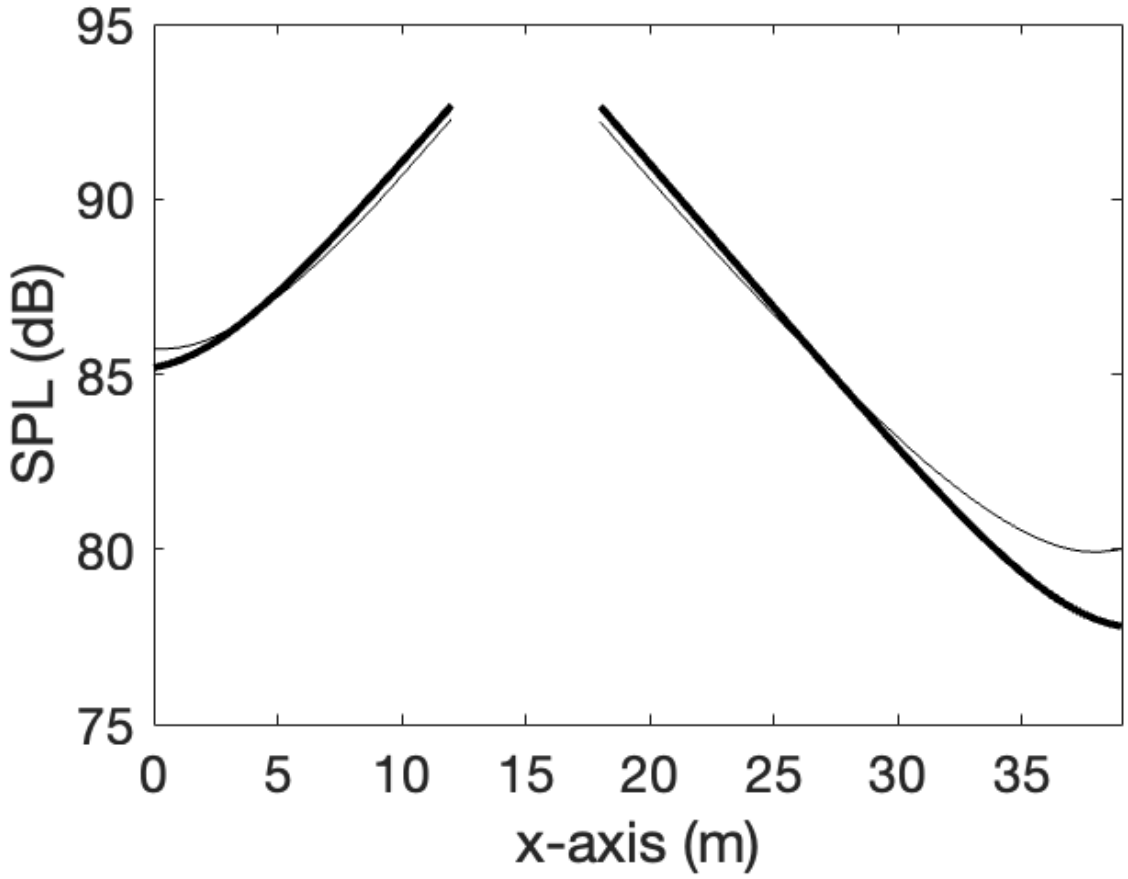
codecheck-fig5c.png

Comment: manuscript Figure 5c



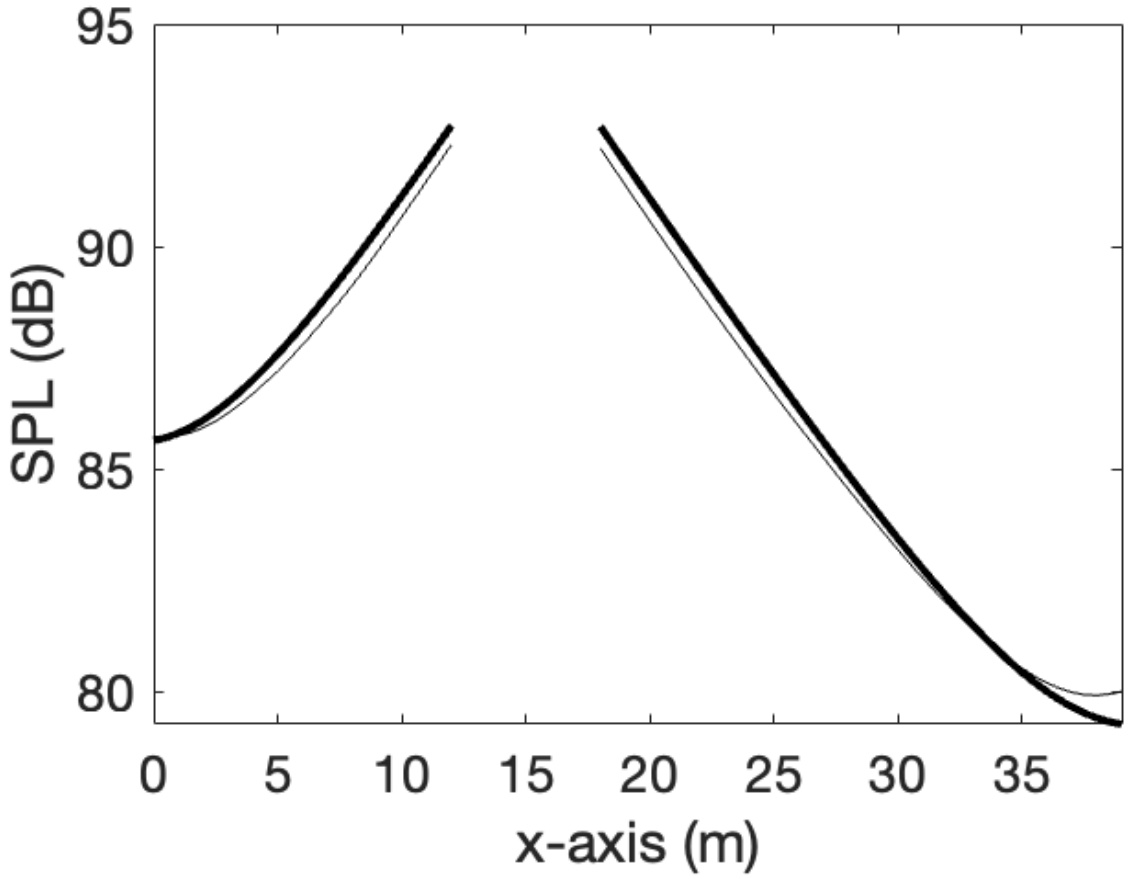
codecheck-fig7a.png

Comment: manuscript Figure 7a



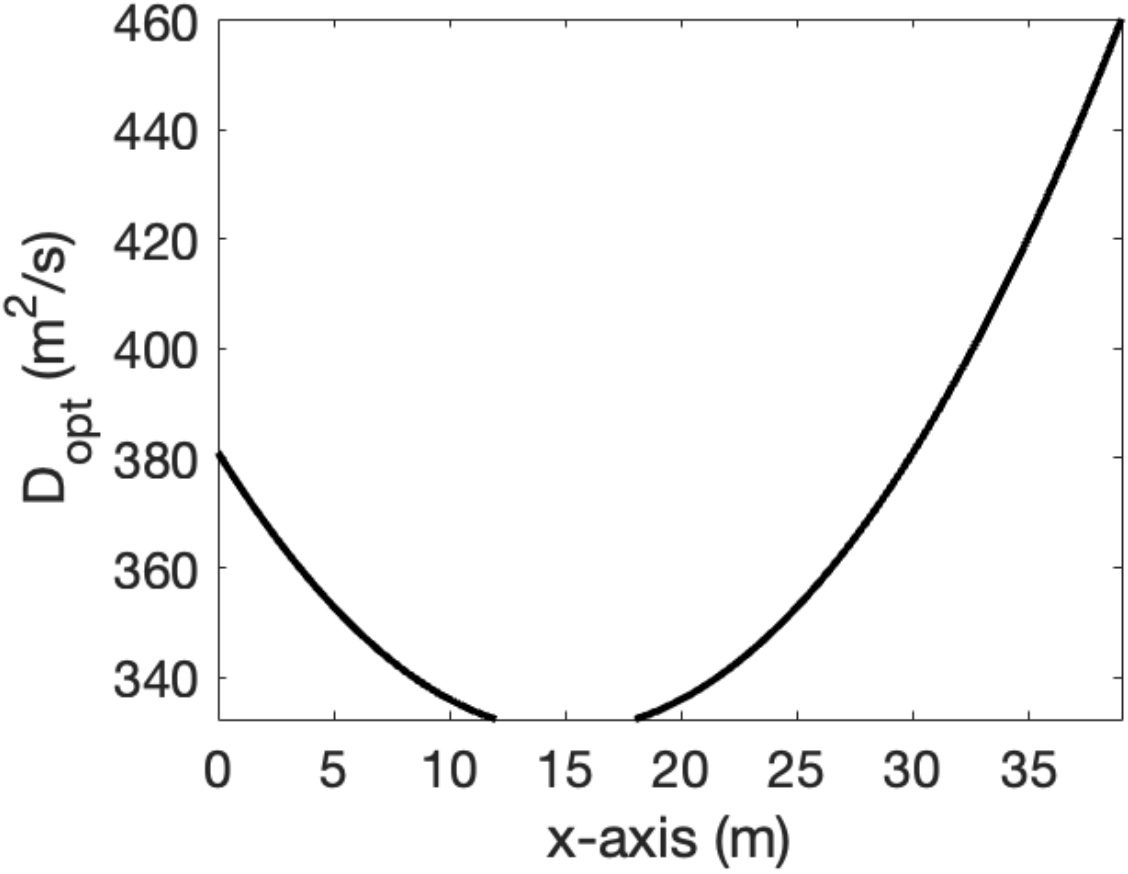
codecheck-fig7b.png

Comment: manuscript Figure 7b



codecheck-fig7c.png

Comment: manuscript Figure 7c



Acknowledgements

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Citing this document

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About CODECHECK

This certificate confirms that the codechecker could independently reproduce the results of a computational analysis given the data and code from a third party. A CODECHECK does not check whether the original computation analysis is correct. However, as all materials required for the reproduction are freely available by following the links in this document, the reader can then study for themselves the code and data.

About this document

This document was created using R Markdown using the `codecheck` R package. `make codecheck.pdf` will regenerate the report file.

```
sessionInfo()
```

```
## R version 4.4.2 (2024-10-31)
## Platform: aarch64-apple-darwin24.1.0
## Running under: macOS Sequoia 15.1.1
##
## Matrix products: default
## BLAS:   /opt/homebrew/Cellar/openblas/0.3.28/lib/libopenblasp-r0.3.28.dylib
## LAPACK: /opt/homebrew/Cellar/r/4.4.2_2/lib/R/lib/libRlapack.dylib;  LAPACK version 3.12.0
##
## locale:
## [1] en_GB.UTF-8/en_GB.UTF-8/en_GB.UTF-8/C/en_GB.UTF-8/en_GB.UTF-8
##
## time zone: Europe/London
## tzcode source: internal
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets
## [6] methods   base
##
## other attached packages:
##  [1] readr_2.1.5      tibble_3.2.1     xtable_1.8-4
##  [4] yaml_2.3.10      rprojroot_2.0.4  knitr_1.48
##  [7] codecheck_0.10.1 parsedate_1.3.1  R.cache_0.16.0
## [10] gh_1.4.1
##
## loaded via a namespace (and not attached):
##  [1] xfun_0.49         rdflib_0.2.9      tzdb_0.4.0
##  [4] vctrs_0.6.5       tools_4.4.2       generics_0.1.3
##  [7] curl_5.2.3        parallel_4.4.2    fansi_1.0.6
## [10] pkgconfig_2.0.3   R.oo_1.27.0       redland_1.0.17-18
## [13] assertthat_0.2.1  lifecycle_1.0.4   compiler_4.4.2
```

```
## [16] atom4R_0.3-3      stringr_1.5.1     keyring_1.3.2
## [19] htmltools_0.5.8.1 pillar_1.9.0      crayon_1.5.3
## [22] whisker_0.4.1     tidyr_1.3.1       R.utils_2.12.3
## [25] cachem_1.1.0      zen4R_0.10        tidyselect_1.2.1
## [28] zip_2.3.1         digest_0.6.37     stringi_1.8.4
## [31] dplyr_1.1.4       purrr_1.0.2       fastmap_1.2.0
## [34] cli_3.6.3         magrittr_2.0.3    XML_3.99-0.17
## [37] crul_1.5.0        utf8_1.2.4        osfr_0.2.9
## [40] withr_3.0.2       bit64_4.5.2       roxygen2_7.3.2
## [43] rmarkdown_2.29    httr_1.4.7        bit_4.5.0
## [46] R.methodsS3_1.8.2 hms_1.1.3         memoise_2.0.1
## [49] evaluate_1.0.1    rlang_1.1.4       Rcpp_1.0.13-1
## [52] glue_1.8.0        httpcode_0.3.0    xml2_1.3.6
## [55] fauxpas_0.5.2     rorcid_0.7.0      vroom_1.6.5
## [58] jsonlite_1.8.9    R6_2.5.1          plyr_1.8.9
## [61] fs_1.6.5
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