CODECHECK certificate 2025-021 for Airspeed estimation for UAVs using only propeller feedback

Item	Value
Title	Airspeed estimation for UAVs using only propeller feedback
Authors	Evangelos Ntouros (0009-0006-3918-4240) Pavel Kelley Ewoud Smeur (0000-0002-0060-6526)
Ref. paper	https://doi.org/10.48550/arXiv.2507.03456
Codechecker(s)	Heather Andrews (0000-0002-6637-2830)
Date of Check	2025-07-30
Summary	Full reproduction of the figures shown in the manuscript. Figures 1 and 3 from the manuscript are pictures which are also provided in the `./photos/` directory of the code repository. All other figures are plots that are fully reproduced by the scripts found in the `./src/` directory of the code repository. The figures are displayed in MATLAB itself and are provided as pdf's in the `./pdf/` directory of the code repository.
Repository	https://github.com/codecheckers/certificate-2025-021
Ref. certificate	https://doi.org/10.5281/zenodo.16616998

Table 1: CODECHECK summary

Output	Comment
./pdf/Cp-J_eta.pdf	Manuscript figure 2
./pdf/Cp-J.pdf	Manuscript figure 4
./pdf/bem_Va-P-wconst_fit.pdf	Manuscript figure 5
./pdf/wt_Va_fit.pdf	Manuscript figure 6a
./pdf/wt_rpm.pdf	Manuscript figure 6b
./pdf/flight_Va_predict.pdf	Manuscript figure 7a
./pdf/flight_alpha_J.pdf	Manuscript figure 7b

Table 2: Summary of output files generated

Summary

The manuscript contains 7 figures, from which Figures 1 and 3 correspond to exemplifying pictures of the unmanned aerial vehicle used and the wind tunnel experiment setup. Those figures can be found in the `./photos/` directory of the code repository. All other 5 figures can be reproduced using the MATLAB scripts found in the `./src/` directory. The figures are by default only displayed within MATLAB itself, but they are also provided in the `./pdf/` (and `./figs/`) directory. In addition to this, the core scripts found in the `./src/` directory also generate the `.mat` files found in `./models/` for re-usability purposes.

CODECHECKER notes

- The code repository has been reviewed by the codechecker, not only in terms of reproducibility of outputs but also other aspects such as repository structure, documentation and licensing information. All feedback was well received and has been processed by the main author of the code repository.
- The code repository has reserved a DOI from the 4TU.ResearchData archive. The reserved DOI of the code repository is https://doi.org/10.4121/8bcecbac-5478-4595-b629-4378feac6dcb It will become active once the article is published. But the code is already open-source in a public Github repository https://github.com/tudelft/propeller_airspeed_sensor and the pre-print is already published in the arXiv(https://doi.org/10.48550/arXiv.2507.03456).
- About the core scripts found in the `./src/` directory:
    - when run with the default values they display the figures within MATLAB itself (plots are not printed to files) and generate output to the MATLAB command window. The displayed figures are also provided by the authors in the `./pdf/` and `./figs/` directories of the code repository.
    - The core scripts can also generate the `.mat` models found in `./models/` (these instructions are commented in the scripts).
- The scripts run smoothly and fast. The only thing users must adjust are the paths, which are specified at the beginning of the scripts.

Installation prerequisites and computational environment

The code scripts have been developed and tested in MATLAB R2024a.

The codechecker has reviewed the code scripts in MATLAB R2025a run in both Windows 11 and MacOS Sequoia 15.4.1. No extra modules were required (other than the ones installed by default).

See more information in the `README.md` of the code repository: https://github.com/tudelft/propeller_airspeed_sensor/blob/main/README.md

Data preparation

The code scripts require Blade Element Momentum (BEM) simulation data, which is provided by the authors in the repository itself (obtained using the BEM tool CCBlade; https://github.com/WISDEM/CCBlade).

Running the code

In order to run the scripts, users must modify the paths accordingly (at the beginning of the scripts). Keep in mind all paths are specified in Unix form by default (e.g. `../data/input/BEM.mat`). So when running the scripts in Windows systems, the paths must be modified accordingly.

Outputs

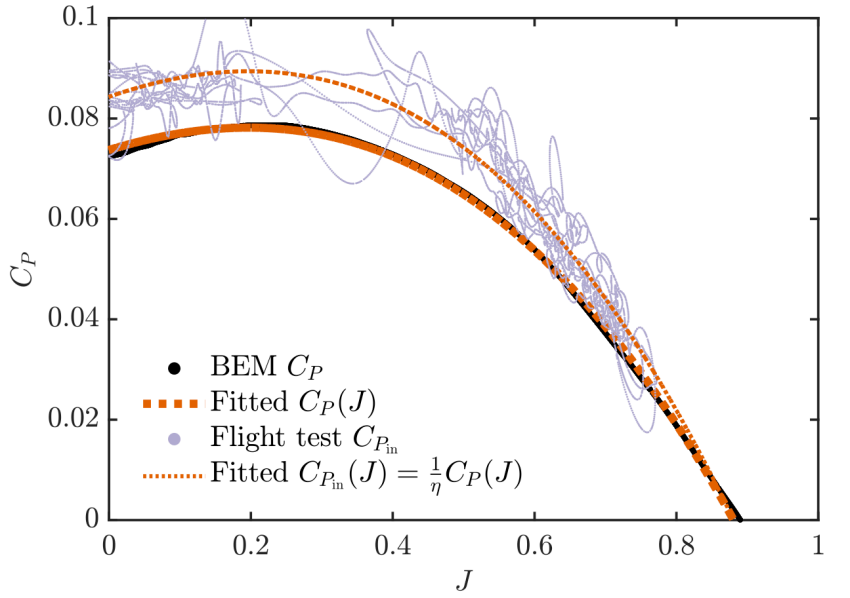
In the original code repository, the scripts display the figures within MATLAB itself and generate output to the MATLAB command window. The scripts do not save the figures to files, but the authors do provide the figures in `.fig` and `.pdf` format in the `./figs` and `./pdf/` directories, respectively.

For reproducibility purposes, the codechecker deleted the provided figures and added the printing instructions to the scripts to save the figures from scratch. This resulted in a different positioning of the legend in some of the figures (compared to the figures presented in the related publication). However this can be easily adjusted, and it is only the positioning of the legend, not the content of it nor the content nor labels of the plot itself.

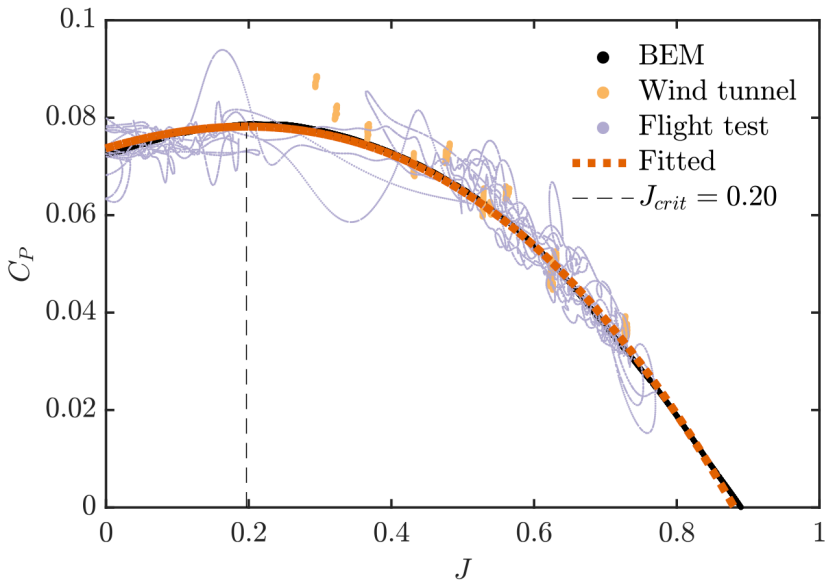
The following are screenshots of the reproduced figures with the positioning of the legends corrected. As mentioned above, these figures are also provided by the authors in the repository itself (in the `./pdf/` directory of the code repository).

In addition to that, all outputs to the MATLAB command window are now described in the `README.md` of the code repository (see **Default outputs**; https://github.com/tudelft/propeller_airspeed_sensor/blob/main/README.md#default-outputs).

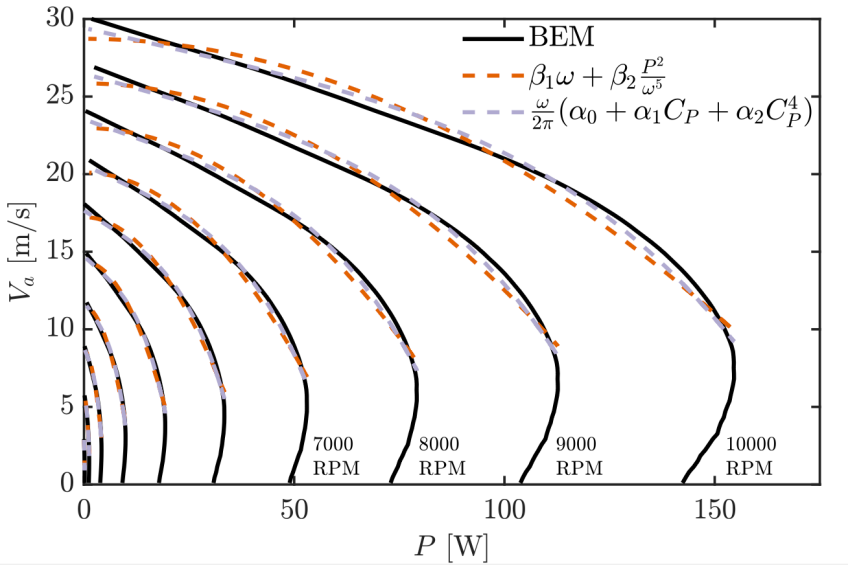
`Cp-J_eta.pdf`: manuscript's figure 2 (generated by `./src/efficiency_calc.m`)



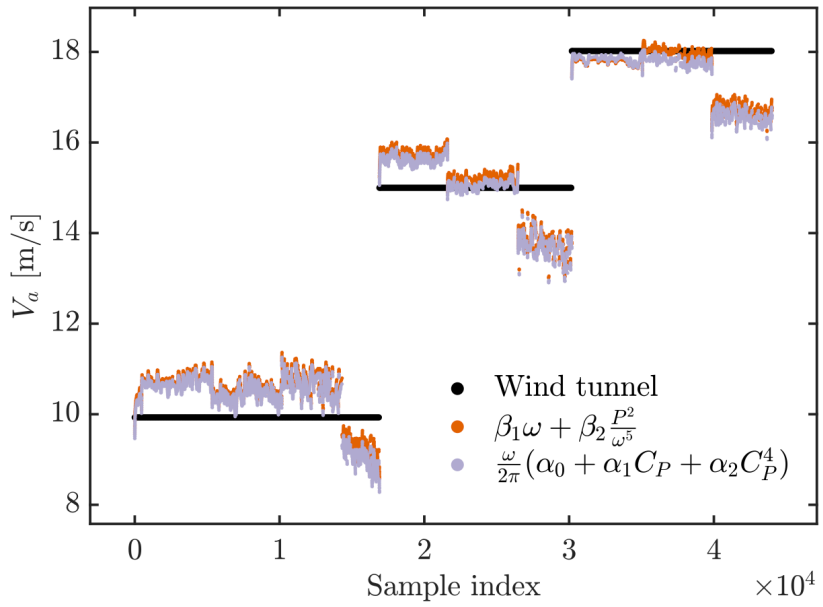
`Cp-J.pdf`: manuscript's figure 4 (generated by `./src/Jcrit_calc.m`).



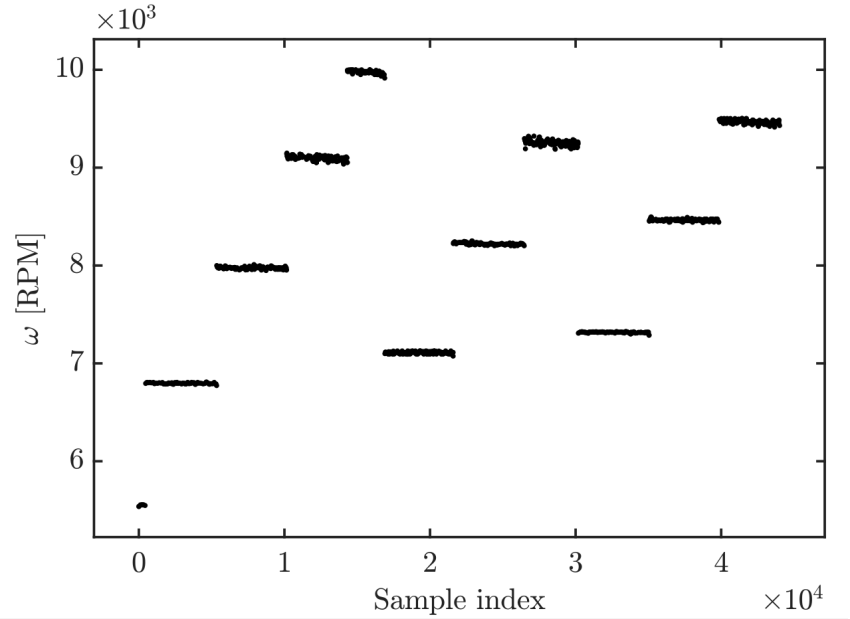
bem_Va-P-wconst_fit.pdf: manuscript's figure 5 (generated by `./src/airspeed_fit_BEM.m`).



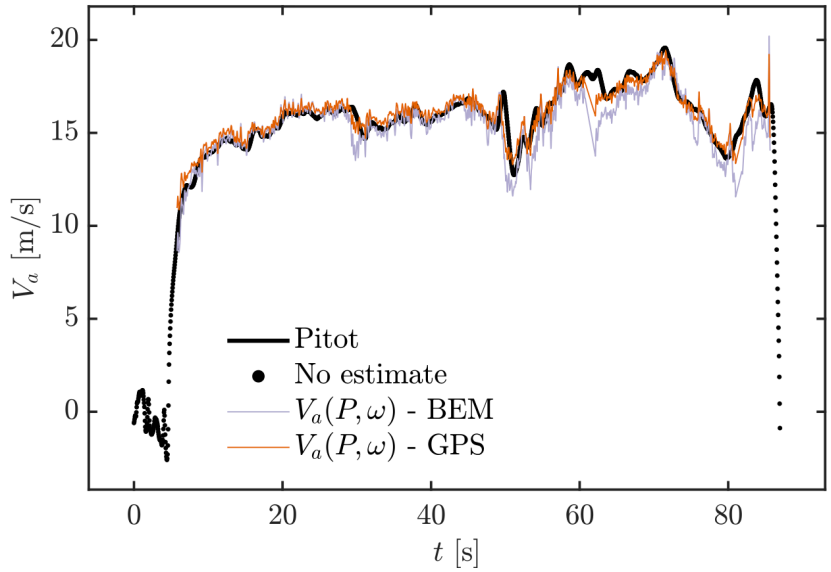
wt_Va_fit.pdf: manuscript's figure 6a (generated by `./src/airspeed_fit_WT.m`).



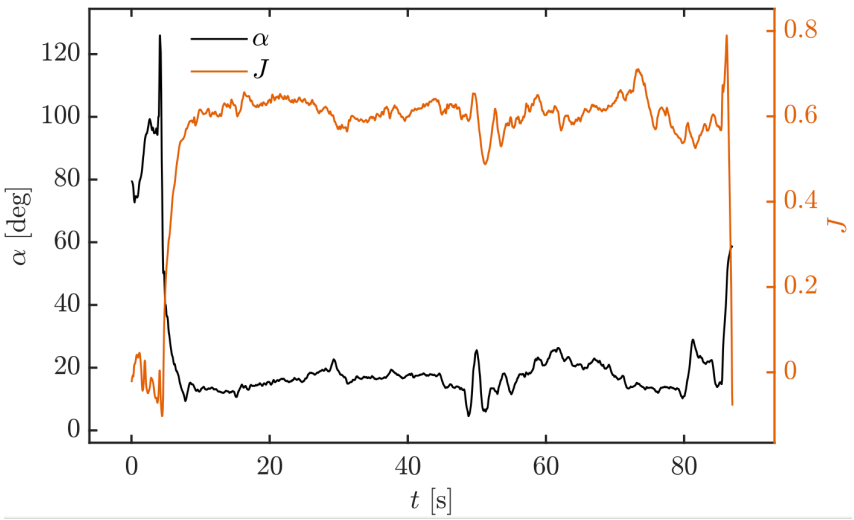
wt_rpm.pdf: manuscript's figure 6b (generated by `./src/airspeed_fit_WT.m`).



flight_Va_predict.pdf: manuscript's figure 7a (generated by `./src/airspeed_predict.m`).



flight_alpha_J.pdf: manuscript's figure 7b (generated by `./src/airspeed_predict.m`).



Acknowledgements

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Citing this document

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https://doi.org/10.5281/zenodo.16616998

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.