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MASTER CORO-IMARO
“CONTROL AND ROBOTICS”

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Bibliography Report

Presented by

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**Making Flips With Quadrotors In Constrained
Environments**

Jury

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Abstract

Within the rapidly growing aerial robotics market, one of the most substantial challenges in the quadrotor community is performing aggressive maneuvers, especially multi-flip maneuvers. A proper physical definition of the issue is not addressed by the current approaches in the field and several key aspects of this maneuver are still overlooked. It can be shown, in particular, that making a flip with a quadrotor means crossing the parallel singularity of the dynamic model. The aim of the master thesis is to explore the possibility of defining aggressive trajectories for quadrotors on the basis of their dynamic model degeneracy analysis and to adapt various strategies to control the robot in a closed loop. In addition, the possibility to perform the aggressive maneuver in constrained environments will also be investigated. Therefore, the analysis will be extended from the previous studied to create general feasible trajectories that will allow quadrotors to perform aggressive flip maneuvers while passing through a constrained environment and while guaranteeing a satisfactory degree of robustness to the uncertainties of the dynamic model.

Acknowledgements

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Secondly, I would also like to thank Dr. Ina Taralova for providing me with the valuable knowledge to create a proper bibliography.

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Notations

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Introduction

State of the art

1.1 First topic

1.2 Second topic

Actual work

When dealing with rectangled triangles (see Figure 2.1) I sometimes used this theorem from [?]:

$$a^2 + b^2 = c^2 \quad (2.1)$$

The demonstration is in Appendix A.

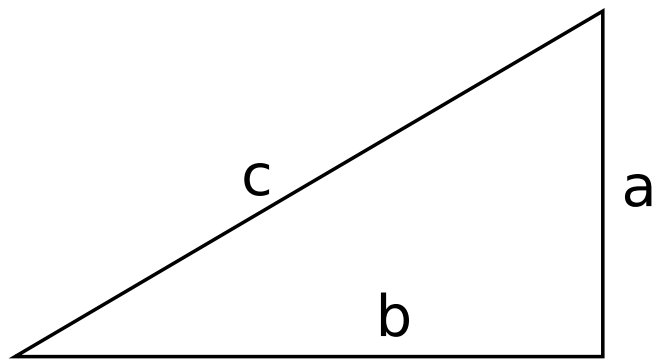


Figure 2.1: A triangle with letters

Experiments

When trying to draw a rectangled triangle, my program comes up with Figure 3.1 that is neither rectangled nor a triangle.

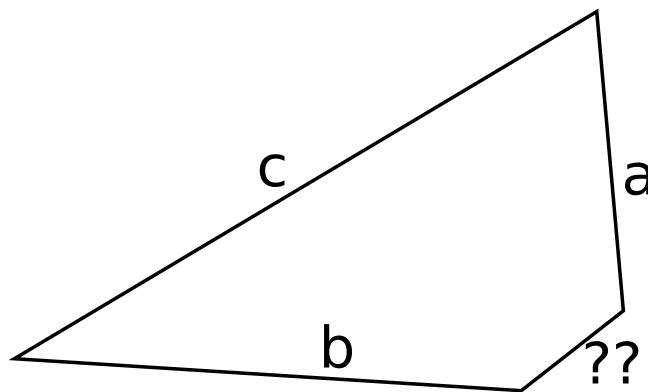


Figure 3.1: Triangle drawn by my program. Note the 4th side.

Unless there is a bug in my program, which is unlikely, this research indicates that the whole theory on triangles having 3 sides has been wrong for years, maybe decades.

Conclusion

Proof of theorem 2.1

Proof. (2.1) was already demonstrated in [?].

□