Progress Report

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1 DLO Dataset Tests

- Clamped end low, DLO on table and flat, change gripper pose, no twist on DLO: omega shape, s shape, u shape, circle shape, ellipse shape, spiral.
- Clamped end low, DLO on table and 3D, with twist: same shapes.
- Clamped end low, DLO angles at 30 degrees and 3D, without twist.
- Clamped end low, DLO angles at 45 degrees and 3D, without twist.
- Clamped end low, DLO angles at 60 degrees and 3D, without twist.
- Clamped end low, DLO angles at 75 degrees and 3D, without twist.
- Clamped end low, DLO angles at 90 degrees and 3D, without twist.
- Clamped end low, DLO angles at 30 degrees and 3D, with twist.
- Clamped end low, DLO angles at 45 degrees and 3D, with twist.
- Clamped end low, DLO angles at 60 degrees and 3D, with twist.
- Clamped end low, DLO angles at 75 degrees and 3D, with twist.
- Clamped end low, DLO angles at 90 degrees and 3D, with twist.

2 Progress

The following items are listed in the order of priority:

- DoD SMART (Dec 1st.): I have been working on this. The application is ready, I just need to finish the statement.
- DLO Dataset (Dec 1st.): The DLO mount has been designed and should be printed by now. I will make a spreadsheet for the part needed.
- DLO Manipulation (IROS): [1].

- Maicol (REU): He is working with me on DLO dataset.

- XEst (RAL —): No update.

References

[1] I. Abraham, G. De La Torre, and T. D. Murphey, "Model-based control using koopman operators," *arXiv preprint arXiv:1709.01568*, 2017.

3 Research Plan - Out of date

This section outlines my current research plan where the main ideas, target conference/journal, and expected date of completion for each paper are provided. Target conferences: ICRA, IROS (March), CASE (Late Feb.), NIPS. Target Journals: RAL, CVPR, CORAL.

- Koopman-01 (IROS - Dec. 1st - active): Koopman-based MPC control of VTOL-DIP and VTOL-TIP in simulation, DLO pose estimation in simulation, experiments on choice of basis function and lifting dimensions, and performance comparison with optimal, robust, and/or adaptive control schemes.
- Koopman-02 (ACC - Sep 30th - active): A review on Koopman-based control schemes. Not enough, make it part of another paper. Read papers and write literature reviews.
- Koopman-03 (RAL - Mar. 1st - status): Extension to Koopman-01, Koopman-based dynamic estimation of DLO, collect dynamic DLO dataset, prediction of DLO configuration.
- Quest-01 (IROS - Mar. 1st - next): Optimal transform solution for QuEst based on dominant mode decomposition (DMD).