

Date: 10/05/11
Location: ACRC
Aircraft: Thor
Pilot: Arion Mangio & James Rosenthal
Flights: 3 Thor

Weather

Sunny, moderate southerly winds, temps around 65F.
METAR KANE 051445Z 16010G15KT 12SM SCT130 20/09 A3009=

[Link to Flight Data](#)

We took Thor to ACRC to test out the new nav filter, fly at ACRC, and run a system ID input. ACRC has a 200 foot paved strip surrounded by sod fields. There are picnic tables for setting up equipment. No major obstructions other than trees behind the field area. We had the place to ourselves, until 4 sheriff's deputies showed up. Apparently they use this area to eat breakfast... fortunately, they didn't bother us.

Wind was an issue, especially aloft. Flight programs had difficulty completing due to heading divergence.

The controller used for flight 23 was the baseline controller. For 24 and 25 it was the composite student controller, with the following gains:
pitch_gain[3] = {-0.6, -0.09, 0.08}; group 1, v1
roll_gain[3] = {-0.45, -0.022, 0.05}; group 3, v1

Software used was /branches/flightcode_nav/ rev 643 for flight 23, rev 645 for flights 24 and 25.

Thor Flight 23: baseline controller, doublets, using new nav filter. R/C Rx: A=237,L=328,F=149,H=0. included ground testing/range check.

Thor Flight 24: student controller, doublets, using old ahrs filter. Onboard video and motor data collected.

Thor Flight 25: student controller, system id multisine input on the rudder. Straight and level for 3 seconds, then hold elevator and inject a 15 second multisine that covers 0.2 to 3.0 Hz, amplitude 3 deg. Lateral-directional controller still engaged. Onboard video and motor data collected. R/C Rx: A=21,L=0,F=0,H=0.

Issues

1. GPS took a long time (10 min) to obtain lock. Not clear why this is happening. Need to install an external MPC5200B reset switch so the sensors can be left powered up while the flight computer is reset.

Flight Data Analysis

New NAV filter: The new filter needs tuning, particularly in pitch. The solution doesn't match the old ahrs filter very well. The estimated IMU biases from the new filter are very dynamic and have large magnitude, which isn't reasonable.

System ID input: Multisine is very clear in pitch rate, Az, and alpha.

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