

Date: 5/21/12  
Location: ACRC  
Aircraft: Thor  
Pilot: Arion Mangio  
Flights: 3 Thor

#### Weather

Sunny, variable wind, temps around 75F. METAR KANE 212045Z 35004KT 12SM SCT250 23/04 A3018=

Andrei, Arion, and Will arrived at ACRC at 2pm to fly on a calm afternoon. The weather was good with a very slight breeze. All flight ops ran smoothly. There were two main objectives for this flight test. First, smooth data from doublets was desired for system identification. Second, Will's baseline controller was to be validated using doublets.

The first flight (44) was for System ID with Thor using 1 second, 4 degree doublets across the roll, yaw, and pitch axes, in that order. This flight was used to complement data from the previous deployment which used manually injected doublets.

Before switching from manual control, the pilot established a hands-off trim. During the doublets, the pilot was instructed to try to keep the airplane level in the axes that were not being excited. The aileron and rudder doublets occurred during the first five seconds, in which the pilot maintained altitude with the elevator. The elevator doublet occurred last, where the pilot maintained level wings using the ailerons. The software used for this flight was [trunk/Software/FlightCode rev 836](#)

After viewing data from the first flight, it was observed that there was some discrepancy in the dutch-roll mode between the predicted model and the actual flight data. It was also found that there was some manual elevator input at the end of each elevator doublet.

The second flight (45) was conducted in the same manner as the first flight. Its goal was to get better data than the first. The pilot paid closer attention to when he transitioned from controlling the elevator to the aileron so that he would not overlay a manual elevator input on top of the elevator doublet. The data from this flight was sufficient for the system identification.

Flight 46 was used to test the baseline controller that Will designed. It consisted of a four second, 20 degree, roll-tracking doublet followed by a four second, 5 degree, pitch-tracking doublet. This flight was completely closed-loop. The data looked very good, so an additional flight test was not needed. The software used for this flight was [branches/WayPointTrack/Software/FlightCode rev 834](#)

Flight 44 was dedicated to doublets on all three surfaces for system ID. The doublet period was one second, and the magnitude was four degrees for each surface.

#### **Thor Flight 44**

Rx data: A096, L303, F001, H000

Flight 45 was similar to flight 44, but with more precise manual pilot input.

### **Thor Flight 45**

Rx data: A006, L041, F000, H000

Flight 46 was dedicated to Will's new baseline controller validation using doublets. There was a 4 four second period, 20 degree roll-tracking doublet, and a 4 degree period, 5 degree pitch-tracking doublet.

### **Thor Flight 46**

Rx data: A045, L026, F000, H000