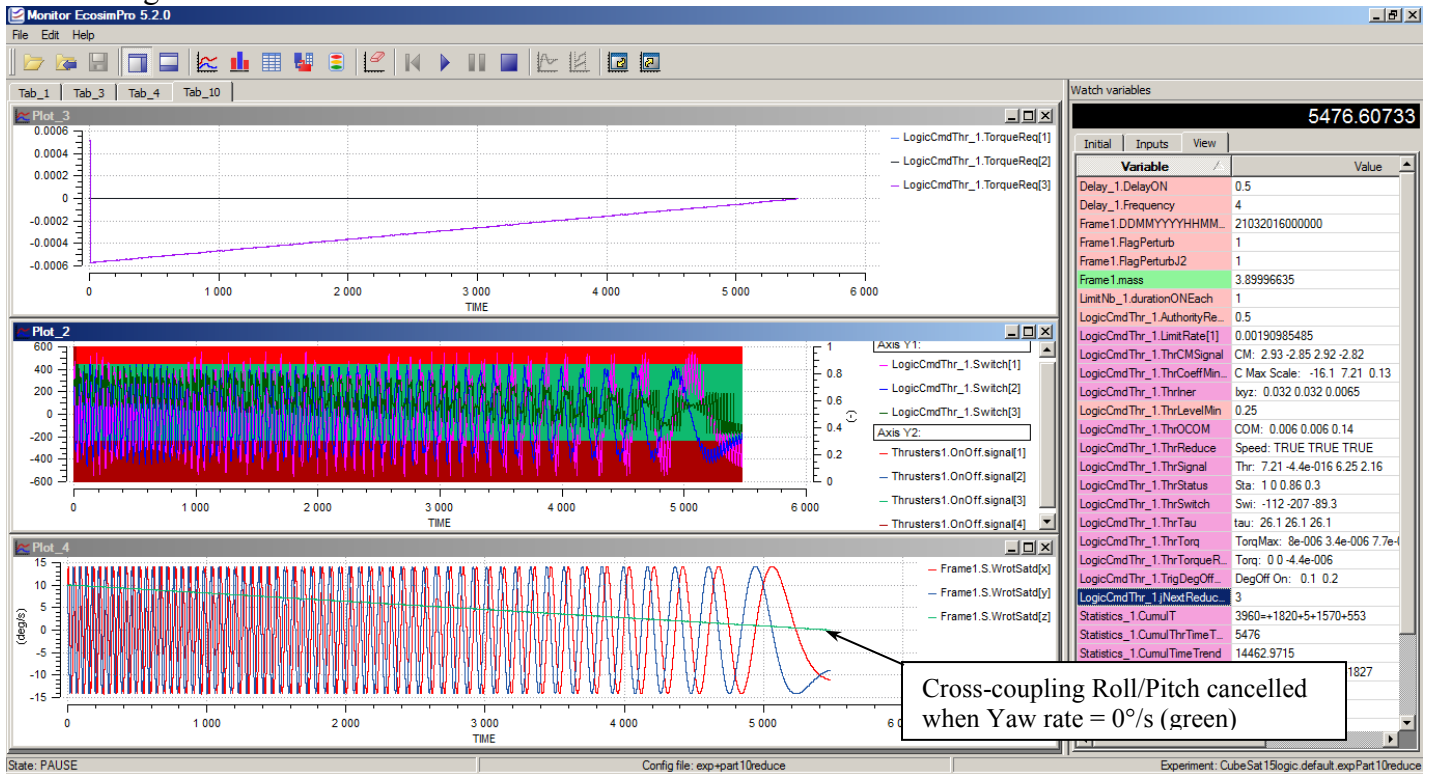


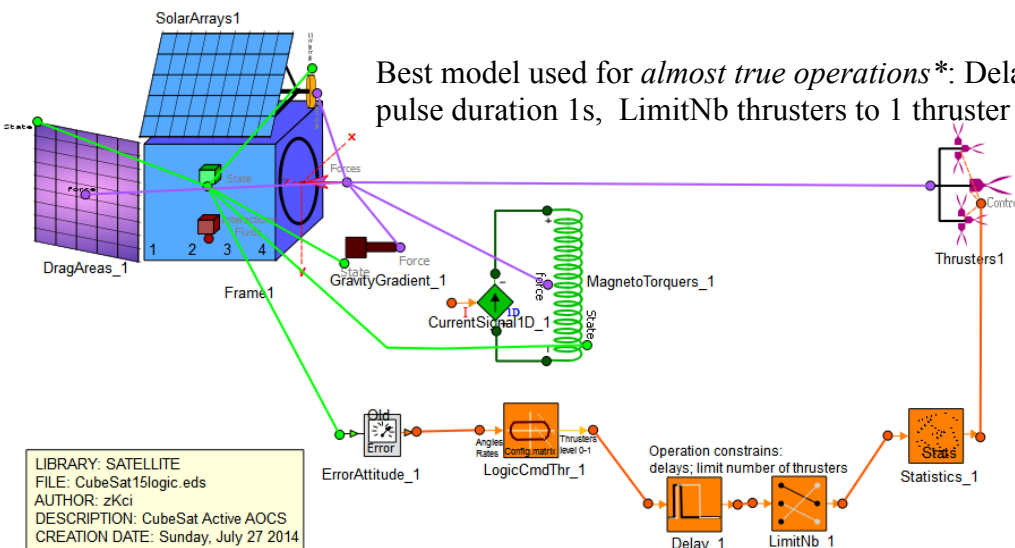
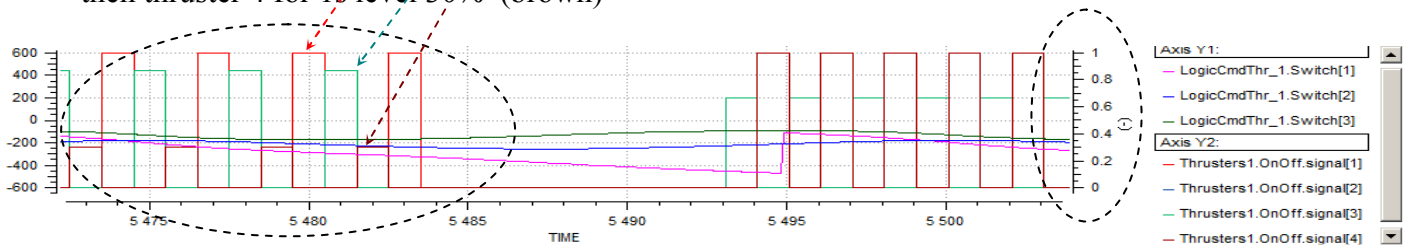
## Detumbling CubeSat 3U with 4 thruster in pyramidal configuration ( $\pm 15^\circ$ wrt Y)

### Detumbling axe Z: duration 5485 s for $+10^\circ/s$ down to $0^\circ/s$



Thruster sequence for Z detumbling:

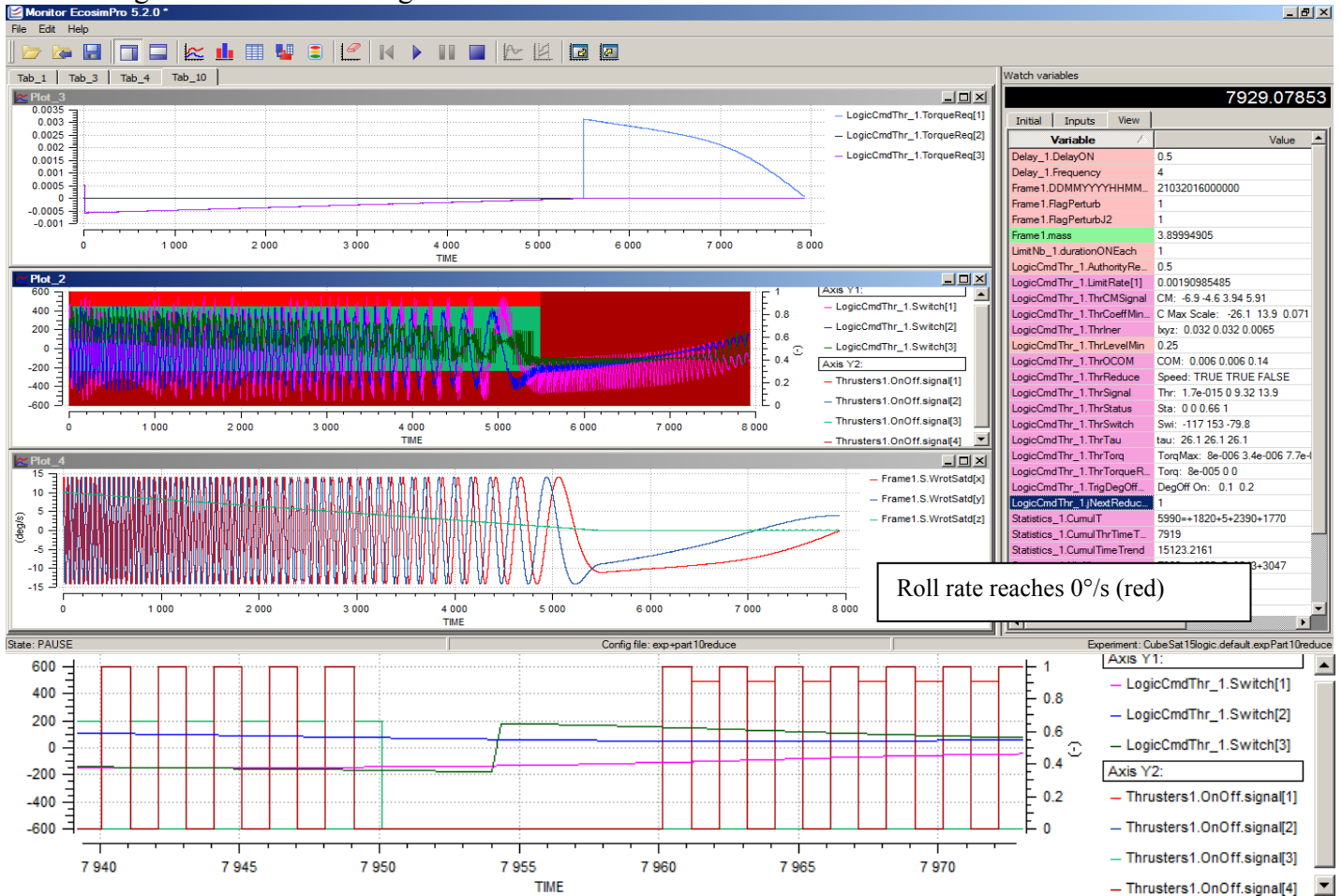
- thruster 1 for 1s level 100% (red)
- then thruster 3 for 1s level 86% (green)
- then thruster 4 for 1s level 30% (brown)



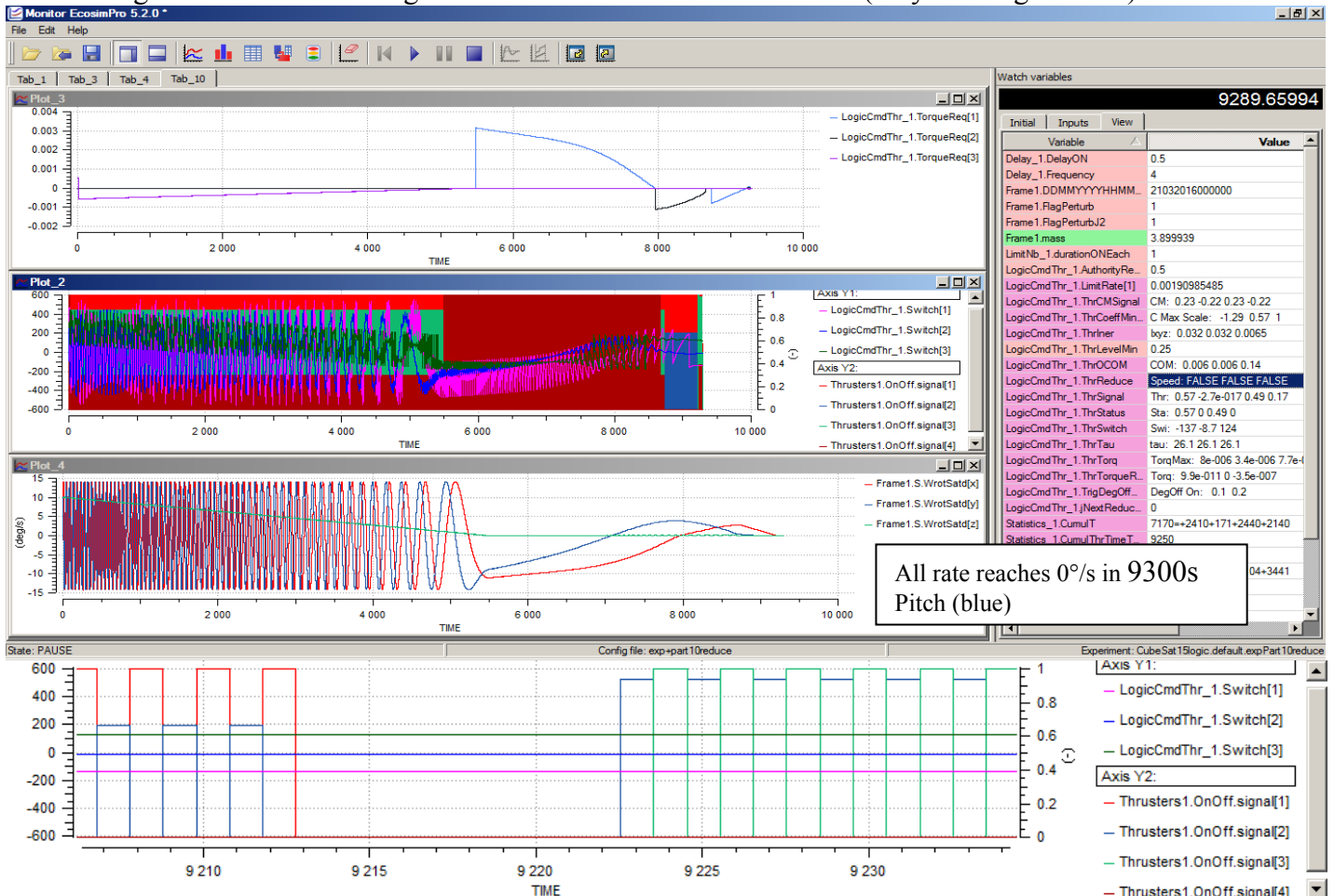
Best model used for *almost true operations*\*: Delay function for 1s, minimum pulse duration 1s, LimitNb thrusters to 1 thruster simultaneously used.

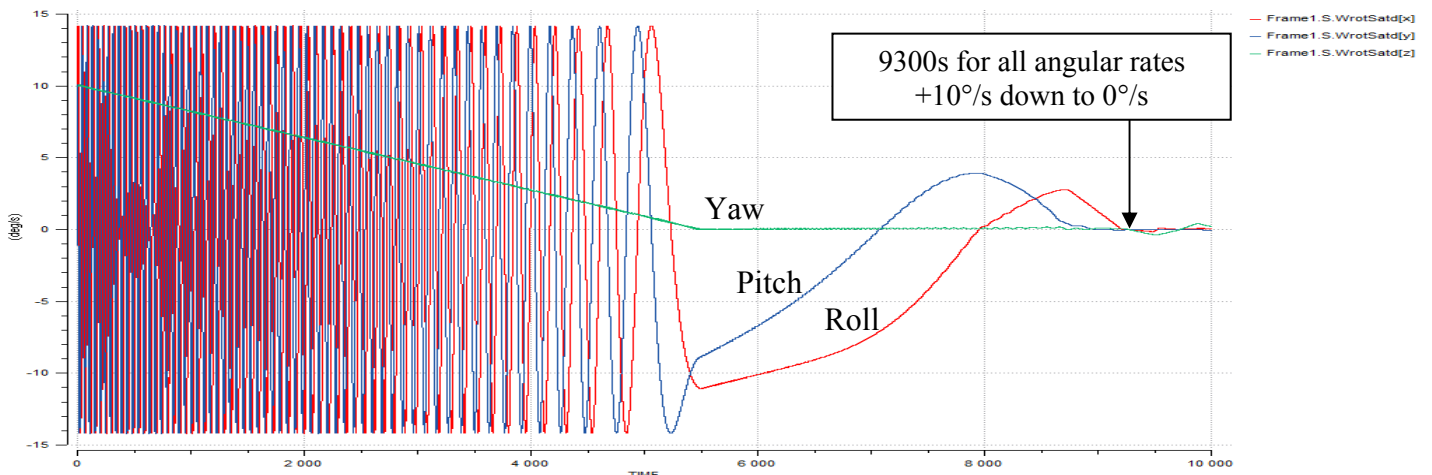
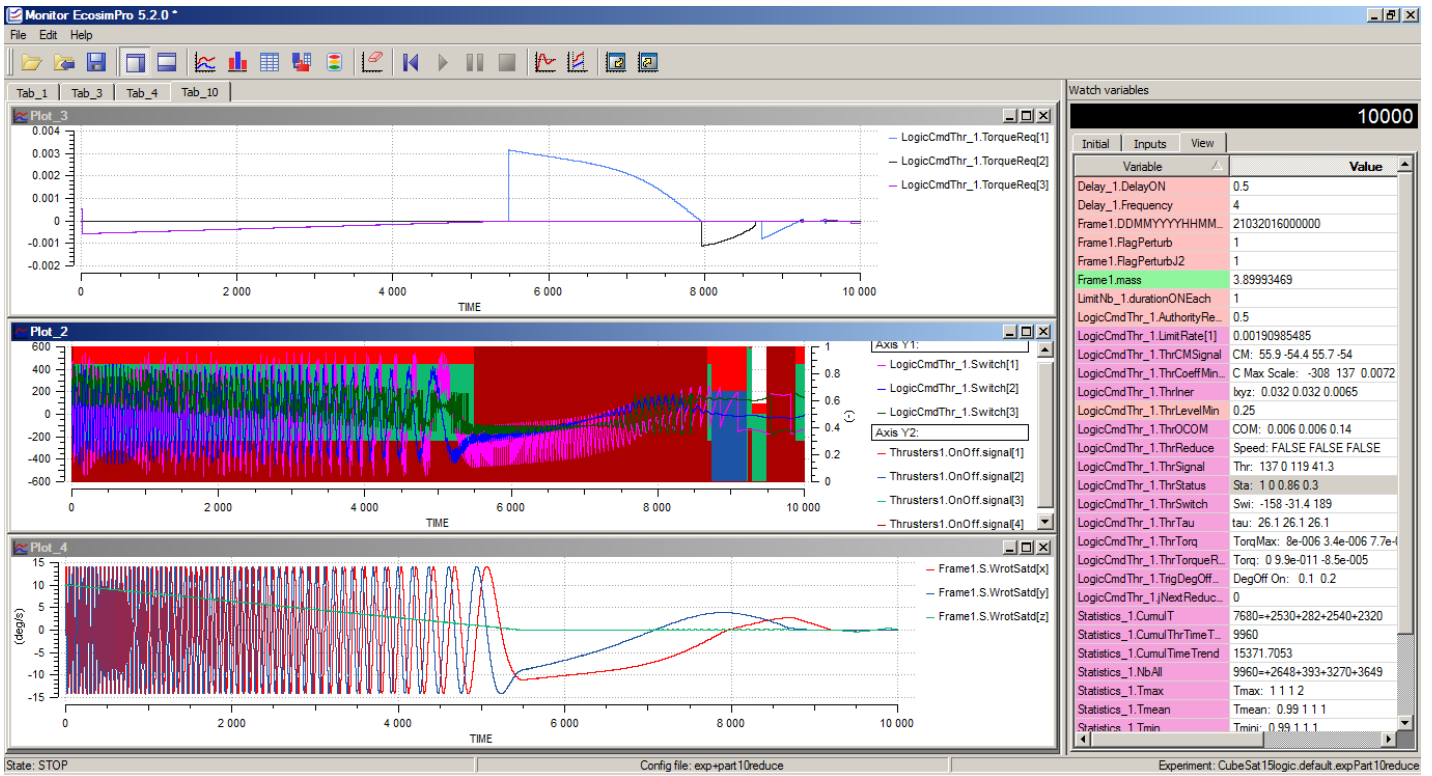
\*Almost true operations because the thrust  $F$  is continuous during 1 second (providing a impulse  $Fdt$  in  $Ns$ ) instead of a very short impulse providing the same  $Fdt$  in the middle of the thrust pulse. The simulation computes commands to the thrusters and use a delay of 0.5s before the pulse of 1 s, so the middle of the thrust pulse is just 1 second after the command. Hence, for the timing no real discrepancy are expected between this simulation and the true operations.

### Detumbling axe X after Z: ending at T=7950s from an initial +10°/s down to 0°/s



### Detumbling all axes Z X Y ending at T=9300s for +10°/s down to 0°/s (very low angular rate)





Fine pointing in series after the detumbling

