NC STATE

Christopher Yoder <cdyoder@ncsu.edu>

Re: Proposed tumbleweed tests

1 message

Paurav Sardeshmukh <pasardes@ncsu.edu> Mon, Aug 5, 2019 at 11:07 PM
To: Christopher Yoder <cdyoder@ncsu.edu>
Cc: Daria Talaski <djtalask@ncsu.edu>

Daria,

PFA test inputs for the first 3 tests:
I have uploaded the "Four_Mass_Setup_10" which can be used for the first 3 tests.

I shall add code for the other tests as we go forward and based on the results of the first three tests.

Thanks,
Paurav

On Mon, Aug 5, 2019 at 4:47 PM Christopher Yoder <cdyoder@ncsu.edu> wrote:

> All,
>
> The following correction should be made to section 2.2:
> "If these values result in a lot of oscillations about 50 deg/s or the rover not rolling close to 50 deg/s, more testing will be needed. "
>
> Any feedback is welcome.
>
> Thanks,
> -Chris
>
> Sincerely,
> Christopher D. Yoder
>
> PhD Student, NC State University
> Engineering Mechanics and Space Systems Laboratory
> Engineering Building 3, Room 3406
> Phone: 434-709-3596
>
> On Sun, Aug 4, 2019 at 10:03 PM Christopher Yoder <cdyoder@ncsu.edu> wrote:
>
>> All,
>>
>> As per our conversation today, the following is a list of every test I can think of which would be useful for the tumbleweed paper. I propose having Daria run **test one** to verify if the kinematic control scheme can actually work in practice, **test two** to determine what kP is required for the speed controller, and **test three** to replicate the cone angle tests already done for the paper. The others are interesting to me but not required and will take a lot of time to complete.
>>
>> Thoughts?
>> -Chris
>>
>> 1. Max speed test
>>   1. Using the maximum displacement of masses, accelerate from rest to find the maximum velocity of the rover. This test can be compared to the sims to see if we can accurately predict the max rover speed.

Stop the rover if it runs out of hallway.
    2. If we pull the data and it is clear that the masses are not being moved to their commanded positions, then we need to tune the mass controllers.
2. kP test
    1. For kP values of 10, 15, 20, 25, and 30, run the rover test for a set point of 50 deg/s. The sim suggests 20 is a good value for the angular velocity controller; these results will validate these sims.
    2. If these values result in a lot of oscillations about 70 deg/s or the rover not rolling close to 70 deg/s, more testing will be needed.
3. Controlled speed test
    1. Allow the rover to accelerate to speed and maintain the speed for set point velocities of 30, 50, 70, and 90 deg/s.
    2. These tests replace the current sets in the paper and validate the control scheme.
4. 0-60-0 test
    1. Allow the rover to accelerate to 60 deg/s. Once the rover makes one complete rotation at 60 deg/s, have the rover brake to decelerate to zero deg/s.
    2. This test demonstrates that the acceleration can be used for deceleration as well as acceleration (when the 3D version has to avoid a rock).
5. Sine wave tracking
    1. The velocity set point is given to the rover as SP = A*sin(wt) + B where w is a frequency of oscillation, A is the amplitude of the oscillations, and B is the nominal static offset of velocity. Try w = 0.2 Hz (5 sec period), A = 20 deg/s, B = 40 deg/s.
    2. This test demonstrates the ability of the rover to follow a non-constant velocity curve (for when the 3D has to steer through a rock field). Ideally, this controller will handle it smoothly and effortlessly.
6. Added mass test
    1. Add mass to the aluminum masses and repeat the angular velocity tests (test three).
    2. This will increase the mm/cm ratio and provide another point for comparison in the paper.

Sincerely,
Christopher D. Yoder

PhD Student, NC State University
Engineering Mechanics and Space Systems Laboratory
Engineering Building 3, Room 3406
Phone: 434-709-3596

--
Paurav Sardeshmukh
Graduate Student
NC State University
Ph:+1(919)-400-0144

Test_input values_for_Daria.docx
12K