USNA Apps

Michael Kutzer <kutzer@usna.edu>

Turret 05 - friction curves

7 messages

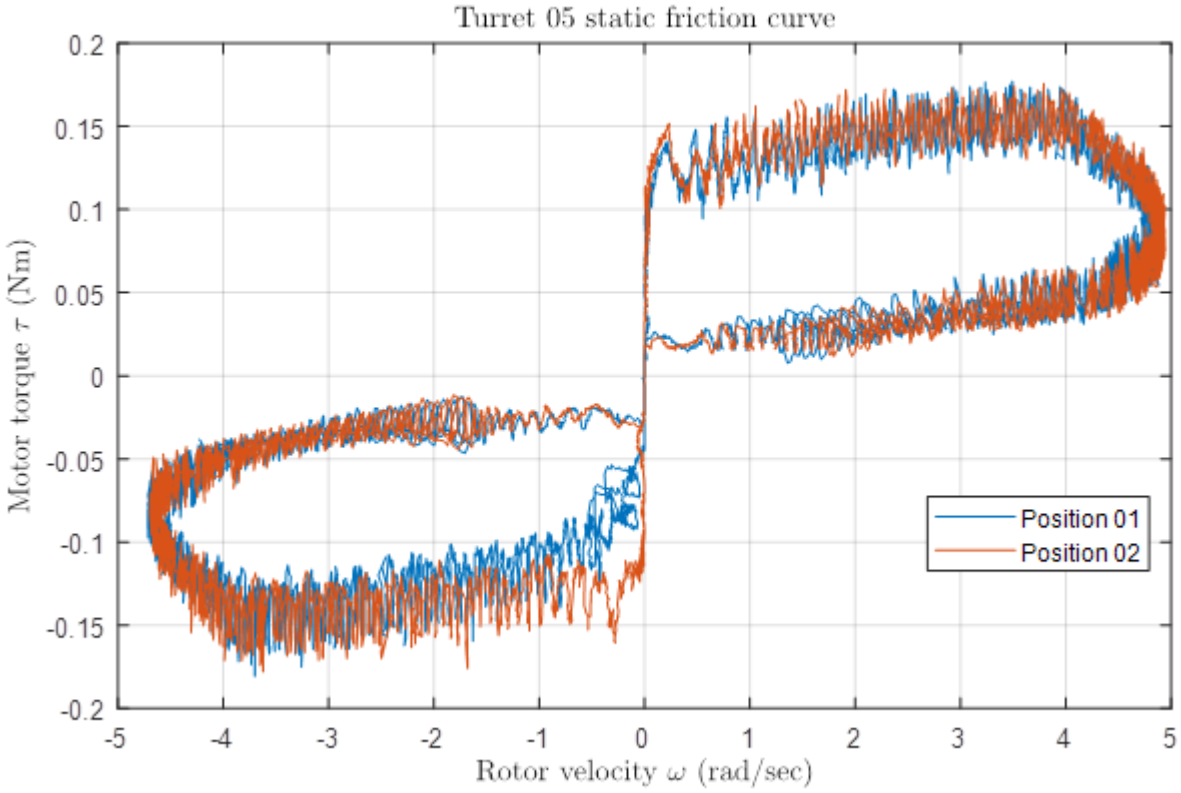
Matthew Feemster <feemster@usna.edu> Tue, Feb 13, 2018 at 4:26 PM
To: Tracie Severson <severson@usna.edu>, Michael Kutzer <kutzer@usna.edu>

Tracie/Mike,

I took turret #5 and performed a small test to characterize the friction. I was interested in seeing if it varied vs. starting position. Below is results of the test. I can see some differences in the negative static friction level for the two positions.

If you are interested, I can provide raw data. Also, I attached a paper for a dynamic friction model that attempts to capture the nonlinear hysteresis type behavior.

Matt



dynamic_friction_model.pdf
527K

Michael Kutzer <kutzer@usna.edu> Tue, Feb 13, 2018 at 4:38 PM
To: Matthew Feemster <feemster@usna.edu>
Cc: Tracie Severson <severson@usna.edu>

This is AWESOME!
[Quoted text hidden]
--
M.D.M. Kutzer, PhD
Assistant Professor
Weapons and Systems Engineering
United States Naval Academy

105 Maryland Avenue
Annapolis, MD 21402
410.293.6113 (Phone)
410.293.2215 (Fax)
kutzer@usna.edu

https://www.usna.edu/Users/weapsys/kutzer/

Tracie Severson <severson@usna.edu> Wed, Feb 14, 2018 at 10:08 AM
To: Michael Kutzer <kutzer@usna.edu>
Cc: Matthew Feemster <feemster@usna.edu>

Great! Thanks for doing this Matt

On another note - will the week of March 5 be good for me to brief your sections on the ES401 Capstone topics for next year? I'll do my best to only take about 30 mins. Matt we can brief our 3/4 sections together
[Quoted text hidden]
--
V/r,
Tracie A. Severson, CDR, Ph.D.
Weapons & Systems Engineering Dept.
Assistant Professor
United States Naval Academy
Office: 410-293-6111
severson@usna.edu

Michael Kutzer <kutzer@usna.edu> Wed, Feb 14, 2018 at 3:14 PM
To: Tracie Severson <severson@usna.edu>
Cc: Matthew Feemster <feemster@usna.edu>

That should work for me.
[Quoted text hidden]

Matthew Feemster <feemster@usna.edu> Thu, Feb 15, 2018 at 8:17 AM
To: Tracie Severson <severson@usna.edu>, Michael Kutzer <kutzer@usna.edu>

Tracie/Mike,

On the friction curve, the test that produced those curves was performed with a linear voltage amplifier. Paul Frontera and I have observed that PWM frequency of the motor driver has an impact on motor operation. I'm going to re-run this test also using our PWM motor driver at 1KHz, 10KHz, and 20 KHz PWM frequencies.

Also, I am planning to have the students go directly to a PID controller. I hope to get a power point discussing why we are doing this in place.

Regards,

Matt

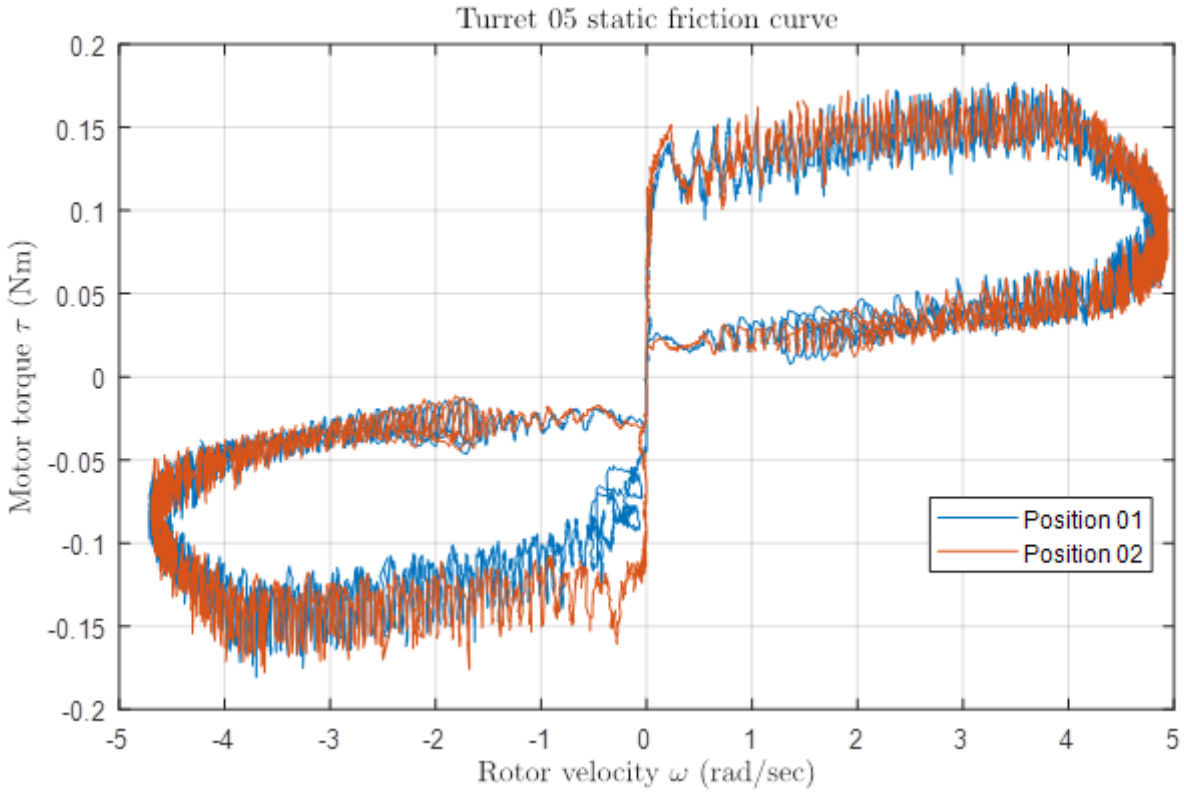
From: Tracie Severson [mailto:severson@usna.edu]
Sent: Wednesday, February 14, 2018 10:09 AM
To: Michael Kutzer <kutzer@usna.edu>
Cc: Matthew Feemster <feemster@usna.edu>
Subject: Re: Turret 05 - friction curves

Great! Thanks for doing this Matt

On another note - will the week of March 5 be good for me to brief your sections on the ES401 Capstone topics for next year? I'll do my best to only take about 30 mins. Matt we can brief our 3/4 sections together

On Tue, Feb 13, 2018 at 4:38 PM, Michael Kutzer <kutzer@usna.edu> wrote:

> This is AWESOME!
>
> On Tue, Feb 13, 2018 at 4:26 PM, Matthew Feemster <feemster@usna.edu> wrote:
>
> > Tracie/Mike,
> >
> > I took turret #5 and performed a small test to characterize the friction. I was interested in seeing if it varied vs. starting position. Below is results of the test. I can see some differences in the negative static friction level for the two positions.
> >
> > If you are interested, I can provide raw data. Also, I attached a paper for a dynamic friction model that attempts to capture the nonlinear hysteresis type behavior.
> >
> > Matt



--

M.D.M. Kutzer, PhD

Assistant Professor

Weapons and Systems Engineering

United States Naval Academy

105 Maryland Avenue

Annapolis, MD 21402

410.293.6113 (Phone)

410.293.2215 (Fax)

kutzer@usna.edu

https://www.usna.edu/Users/weapsys/kutzer/

[Quoted text hidden]

Tracie Severson <severson@usna.edu> Thu, Feb 15, 2018 at 9:19 AM
To: Matthew Feemster <feemster@usna.edu>
Cc: Michael Kutzer <kutzer@usna.edu>

Do you still have the test set-up handy? Would love to see it.

Also I have a few groups ready to move to the turret - I'm going to start them on it today.

I plan to have my groups walk through a discussion on how we would size and select a motor as well as complete a decision matrix to compare a DC motor with an RC servo.
[Quoted text hidden]

Michael Kutzer <kutzer@usna.edu> Thu, Feb 15, 2018 at 10:29 AM
To: Matthew Feemster <feemster@usna.edu>
Cc: Tracie Severson <severson@usna.edu>

I am also planning to have my students go right to a PID controller with this as the justification. I am still planning to have them fit the system response to estimate P.
[Quoted text hidden]