#System_ID_Linear

(*) Chirps_Gen+Data.

(1) Code to generate different types of chirps
hyp = hyperbolic, quad = quadratic, lin = linear

(chirp_hyp.csv, chirp_lin.py, chirp_quad.py).

(2) The csv files contain the data generated by the chirps which is fed to measure_motors.c codes to measure/record parameters.

(3)

(*) chirp_output_from_bb → (Contains data generated by motors after feeding in the chirps as i/p voltage)

(A) finding_constants.

(1) finding_resistance.py.

Read the file mt_data&final_sin_nm.csv
nm = not moving wheels., sin = sinusoidal i/p

To find Resistance
(resistance.ods) (has chart).

~~(1) mtd_sin~~

(2) mtd_const_m.csv = To find No load speed.

(3) sampled_motor_para.py

Finding the constants K, Rgb, b, from data obtained after pasing in chirp.

data files = mtd_chirp_h.csv etc.

(4) motor_para_estm.py

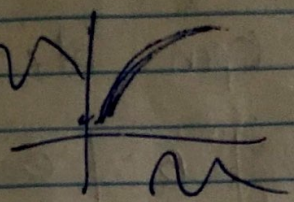
same f^n as (3), just reads data when sinusoidal i/p was given to motor.

data file : mtd_sin_timed_malloc_sleep_p5.csv.

(use e: record significant digits) (gzip)

(A) Determining the imp parameters.

Motor 1 = Left Motor
Motor 2 = Right Motor.



Pol Mot 1 = -1
Mot 2 = +1.

∴ enc2 readings = Right Motor Reading.

∴ enc1 reading = Left motor Reading.

(A) (1) Finding Coil Resistance.

a) Go to File :- mtd sin_nxn_chart.ods.

A	B	C	D	E	F	G	H (Voltage)
M1 Time	M1 Enc	M2 Time	M2 Enc	M1 Current	M2 current	Duty Cycle	G×R.G

Voltage = Duty cycle × 12.4 Volts.

M2 Ra = 6.156Ω = Right
M1 Ra = 7.846Ω = Left (A)

$V_a = I_a R_a + K\omega$
when motor locked is fixed (not moving)
$\omega = 0$.
$\therefore V_a = I_a R_a$
$\therefore R_a = V_a / I_a$.

② Finding No Load Speed

a) Open file :- mtd_const_m.csv

A	B	C	D	E	F	G	H	I
M1	M1	M2	M2	M1	M2	Duty	M1	M2
Sine Time	Enc	Time	Enc	Curr	Curr	cycle	Act. Time	Act. Time

No load speed should be computed when constant voltage, i.e. PWM Duty cycle = 1 is supplied @ 12.4 Volts.

$$\text{speed} : \frac{\theta(t)}{\text{time}} = \frac{\text{distance}}{\text{Time}}$$

@ T = 0sec, E1 = 0.
@ T = 5.04337, E1 = 34224.

$$\therefore \frac{34224}{979.2} = \text{No. of rev}$$

1 rev = 48 pos, Gear ratio = (20.4 : 1)
(48 × 20.4 = 979.2)

No. of rev = 34.95098
1 rev = 2π radians

$$\therefore = 219.492157 \text{ radians}$$

$$\text{Speed} : \frac{P}{T} = 43.52 \text{ rad/sec}$$

Ax = B [ ] x [ ] .

@15sec = 15.126178 , El = 103450.

D = 443.973938

= 44.03 rad/sec . rad/sec

@30sec = 30.25 (15.12435)

= 44.0904 rad/sec

@ 30 from 0sec = 43.97 rad/sec

@ 60sec = 60.493737

= 208077

1334.4807598.

= 44.48

@ 100 sec = 39.822045

= 44.2 rad/sec.

No load avg speed = 44.1 rad/sec.

Left Motor.

No Load
Speed Right Motor

@ 05 sec = 47.88 37 rad/sec.

@ 15 sec = 113866 10.082872

= 48.47 rad/sec

@ 30 sec = 48.49 rad/sec 15.124352

@ 60 sec = 48.39 rad/sec. 30.248206 2082739

@ 100 sec = 48.336. 39.822045

7585779

No load speed Motor Right = 48.4 rad/sec

= M2.

③ finding (K = Motor constant)*

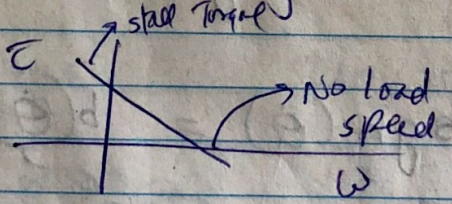
K1 = ? @ No load I ≈ 0.

$\therefore V_a = K\omega$

$\therefore K_1 = \frac{V_a}{\omega_{NL1}} = \frac{12.4}{44.1} = 0.28\ 6384$

$K_2 = \frac{V_a}{\omega_{NL2}} = \frac{12.4}{48.4} = 0.256198$

④ Torque produced when motor is not rotating = stall torque



$\tau_{S1} = \frac{K_1 V}{R_1} = 0.45260\ 79$

$\tau_{S2} = \frac{K_2 V}{R_2} = 0.51656182$