## GalvoModel\_v3\_detailed

Te: electrical torque, gen. by coils [Nm] [A] [Nm] lc: coil current Tfr: rotor dynamic friction torque Trb: torsion bar torque [Nm] angular velocity [rad/s] yrad: angular position [rad] angular position ydeg: [°] [V] Ucci: current controller input [V] [V] Ucco: current controller output Ush: shunt voltage

CL: coil inductance [H]
CR: coil resistance [ohm]
RIN: rotor inertia [kg\*m²]
KTR: torsion bar const [Nm/rad]
BEM: back EMF const [V\*s/rad]
FR: rotor dyn. friction [Nm\*s/rad]
TRC: torque const [Nm/A]

Torque produced by coil current will rotate the rotor until it is balanced by the opposing torque of torsion bar, load and dynamic friction torque.

balance of force: Te=Ttb+Tfr

Te - (Ttb+Tfr)=0 -> no movement

Current controller (Discrete) process controller Galvanometer current Ush Ιc Ttb 1 Coil Ttb Rotor Torque Step current shunt Inductance inertia Torsionbar constant resistor PID(s)/ P(s)\_ Ucci Ucco int3 PID ctrl Saturation: FR < -15V Back el. > 15V motive force Coil resistance friction (including shunt) torque constant position demodulator BEM (capacitive angular pos. sensor) ydeg yrad 180/pi

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