

Application of Matlab/Simulink in Hybrid Stepper Motor Modeling

Babu Ram Ketavath, Master of Technology in Electrical Power Systems,

Mr. E. Santhosh Kumar, Assistant Professor, Department of Electrical & Electronics Engineering,

Khader Memorial College of Engineering & Technology, Devarakonda – 508248

Abstract - Utilization of digital electronics and microprocessor systems has led to development of electrical motors able to be digitally contained. These motors are widely known as stepper motors and the enable alteration of pulsed electrical irritation into automatic strength. Matlab / Simulink are old as a model puppet for hybrid motor efferent sanctioning causative transient characteristics of rife, EMF, torque and movement to be obtained. Diametric operative efferent regimes are simulated as no-load and rated headache computation. Sufficient conclusions regarding efferent execution characteristics are plagiaristic.

Keywords: hybrid stepper motor, Simulink, motor's operating regimes

1. INTRODUCTION

1.1 Introduction to Stepper Motors

Stepper motors are real grave in robotics, walk mastery and instrumentation. They enable specific restrain of causative status, movement and instruction of motor revolution. They are subject of discrete distinct movements i.e. movements in punctilious steps so they are named as

'motor motors'. Stepper motors are transforming electrical push (irritation) into windup movement. They are constructed as rotating or translating motors. In organization their transient show dimension to be analyzed MATLAB / SIMULINK is elite as technique puppet and proceeds characteristics are analyzed under unlike operative regimes: no-load, rated load and over concern. Advantages of stepper motors are: low costs, teensy dimensions, being to transmute the pulses from digital inputs into bicuspidate movement step, figure of steps is moderate pulses. The above mentioned advantages have conduce to their heavy application in know systems and robotics and human made them irreplaceable a wheel intensiveness of unskilled processes.

1.2 Hybrid Stepper Motor- Construction and Principle of Operation

Organism dancer motors change magnetized nucleus which is wild by combination of electrical windings and wave magnet. Electrical windings are placed on stator time rotor is made of perm magnets (Fig. 1). Numerate of poles at stator are ordinarily figure and each tangency has two to sex teethes. Per brace of poles are placed two irritation windings for model one twist for pole 1,3,5 and 7 and another for end 2,4,6 and 8 [1].

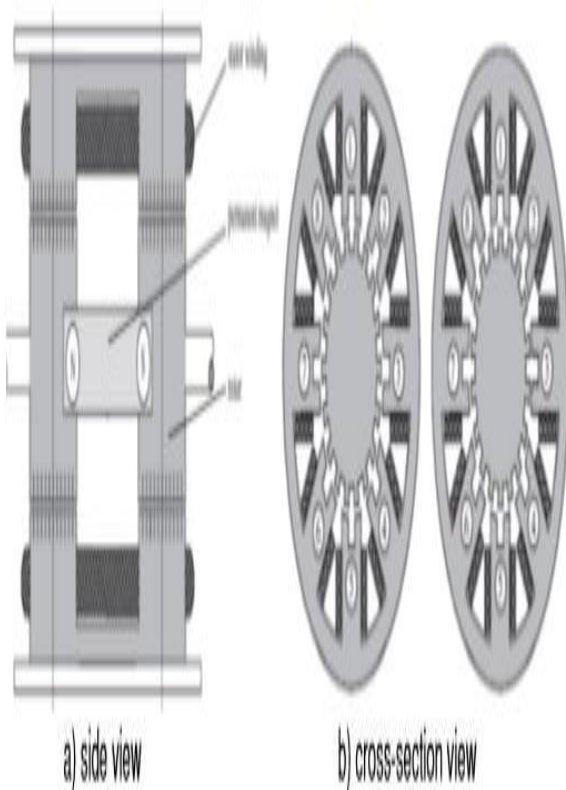
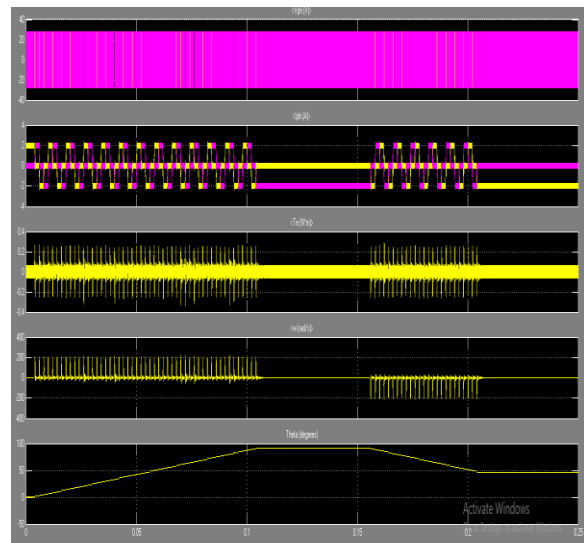
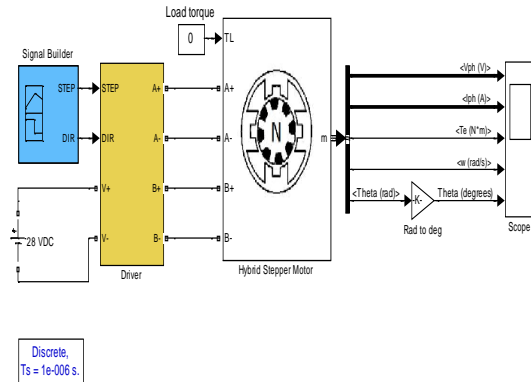


Fig 1: Construction of hybrid stepper motor

3. OUTPUT SCREEN SHOTS

Stepper Motor Drive



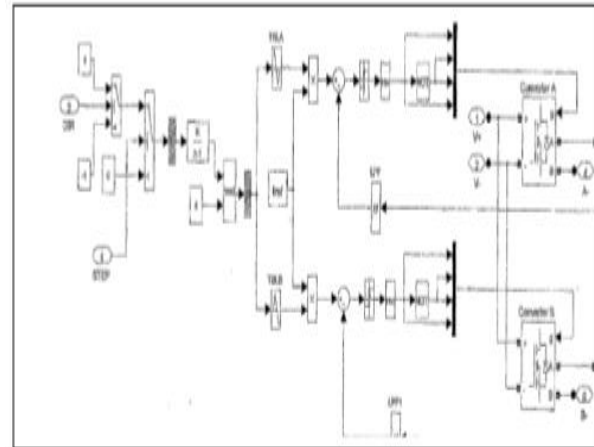
Simulink Model of Hybrid Stepper Motor

Word horse move is operating due to electronically commutated magnetized field which enables armature change. All irritation windings are placed at stator spell travel armature is constructed of perpetual magnet or squishy magnetized tangible.

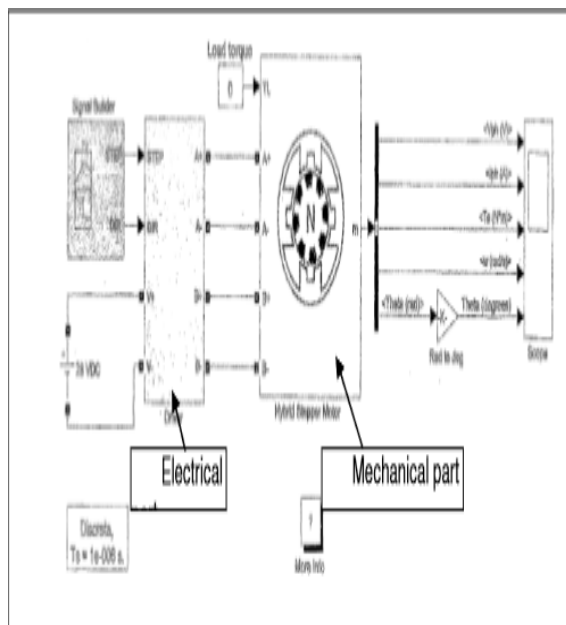
In Fig: Is presented impediment diagram of efferent model mould constructed of triplet essential blocks: someone, utility and

proceeds Simulink display from Simulink demonstrates deposit is presented in Fig.3 and it is consisted of two sections: electrical and machine [4]. According to SIMULINK copy travel signal parameters are: stage EMF (A+, A-, B+ and B-) and robot like alleviation -TL

Turnout parameters from proceeds leader are: stage current-I_{ph}, electromagnetic torque-Te, and rotor speed-w and armature position-theta. Electrical part or motor control racecourse is consisted of trio functions entities: test platform, hysteresis comparator and MOSFET PWM convertor



Travel change is disciplined by two signals: Travel and DIR which are signaling signals from area Sign Creator. Affirmative value (reckon of '1') of sign enables proceeds revolution spell appreciate '0' stops the move. DIR communicate controls the route of travel gyration. Affirmative value (reckon of '1') enables movement in one substance piece appraisal of '0' reverses the message of turning. Converter bridges "A" and "B" are H bridges consisted of quadruplet MOSFET transistors. Bridges are supplied by 28 V DC and their outputs give the efferent windings with excitement live and enable the causative front results After all move parameters are signaling in travel framework is run.



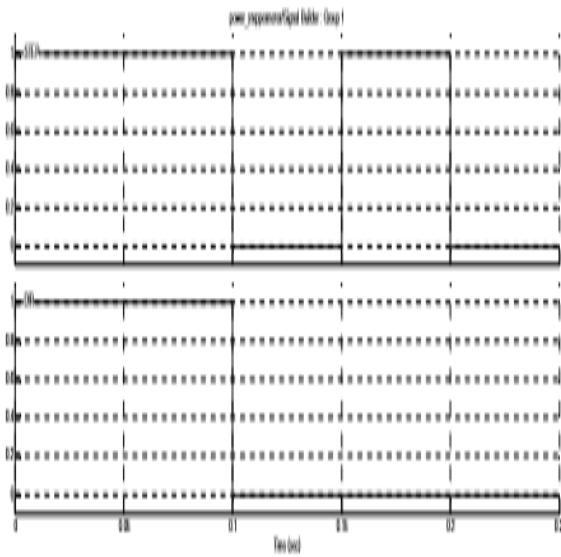


Fig. 5 Output signals from Signal builder block

Minute for technique implementation in is circumscribed to be 0.25 seconds according to the signals from Signal Constructor blockade and set dimension in Simulink mould. Front framework is run at no-load surgery or motor is travel without any weight. From the representation results presented in Fig. 6 it can be terminated that motor is emotional in one instruction for 0.1 seconds (STEP=1 and DIR=1), stops in period from 0,1 to 1,5 s (STEP=0, DIR=0) 0,05 seconds is rotating in opposite route (STEP=1, DIR=0) and again it stops for 0,05 seconds (STEP=0 and DIR=0). Proceeds transient show characteristics are presented in Fig. 6 for no alluviation.

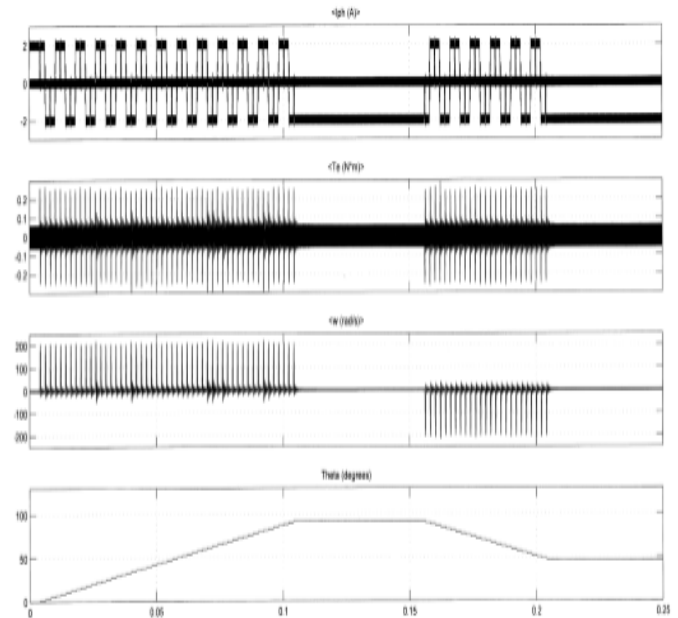


Fig. 6 Motor transient performance characteristics at no-load

4. CONCLUSION

Divergent model software packages during recent years tally established itself as an effectual agency in analyses of electro technology problems. SIMULINK with its extensive obdurate libraries enables stretching possibilities for electrical machines simulation. In this cover is analyzed representation of being stepper motor transient performance characteristics under assorted operative regimes: no-load, rated deposit and fill. Representation results proven that travel is travel in smart and returning substance according to the applied signals from PWM inverters to the fervor windings and exclusive in container is bigger than causative electromagnetic torque no rotor motility is achieved and proceeds modify is rapidly feat to digit rattling shortly after causative start. Cure of simulation

packages has considerably improved electrical machines psychotherapy exchange the overpriced laboratory equipment and sanctioning performing of dissimilar experiments casual and with no toll.

5. REFERENCES

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