Journal of Cardiovascular Disease Research

ISSN:0975-3583,0976-2833 VOL12,ISSUE05,2021

ADVANCED PLUG-IN HYBRID ELECTRIC VEHICLE WITH MULTIPLE SOURCE'S

K.P.M.Y.V.Dathu, P.G student, Saveetha School of Engineering, SIMATS, Saveetha University Chennai, Tamilnadu, India, email, email: datta1997.kota@gmail.com

A.Ananthi Christy, Faculty, Department of Electrical and Electronics Engineering, Saveetha School of Engineering, SIMATS, SaveethaUniversity ,Chennai, Tamilnadu, India, email: jencychristy@yahoo.com

Abstract: -The generation of a Plug-In hybrid electric vehicle (PHEV) is gradually increasing. Electric motors using here are 3 phase A.C induction motor & Permanent Magnet Synchronous Motor. All-wheel drive (AWD) technology is used here to run the vehicle.Increasing the run time of the vehicle and increasing the efficiency of the vehicle by using duel motors, and the pollution & cost of the fuel is decreased. And the traction of the vehicle is increased by using the AWD system.Onanother side, the fuel engine is placed to run the vehicle, when the charge is not available in a battery or while the vehicle required more torque.

Keywords: -Plug-In hybrid electric vehicle, Motor's, All-wheel-drive, Fuel engine, Braking.

1. Introduction

Two types of motors are used in this vehicle to run. 3 phase A.C induction motor & Permanent Magnet Synchronous Motor. All-wheel drive (AWD) technology is used here to run the vehicle, to overcome the traction. PHEV battery can be charged in three ways (PV panel, AC charger, and DC charger) [1, 2].

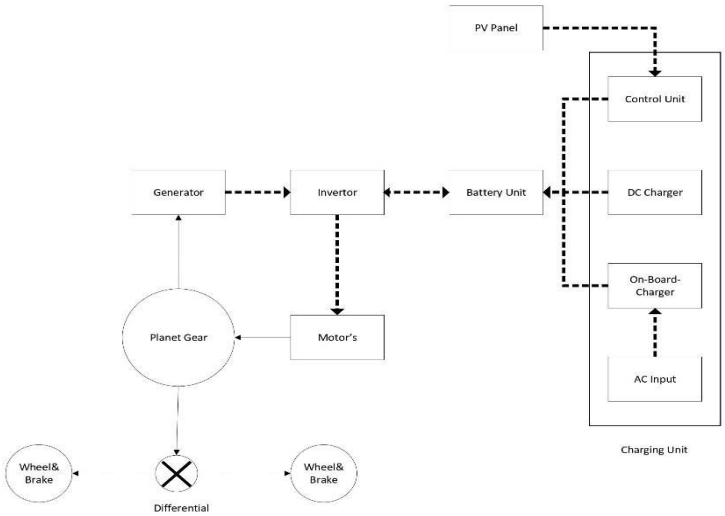

Fig1: - Electrical flow in PHEV

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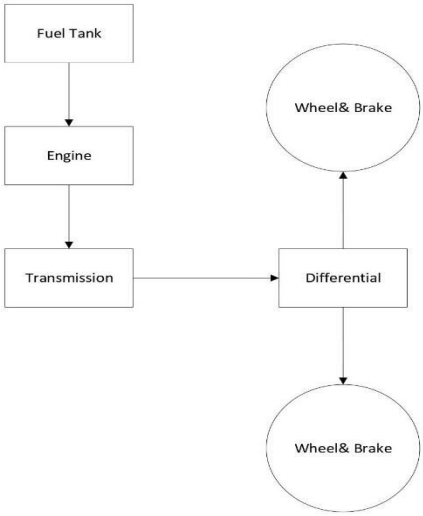

Fig2: - Mechanical flow in PHEV

The above figures (Electrical flow in PHEV & Mechanical flow in PHEV) show the block diagram of the electrical & mechanical flow in a PHEV. Like this flow, the PHEV runs [3, 4].

Specification's	**3-phase A.C I.M**	**Permanent Magnet S.M**
Aerodynamic drag coefficient	0.12	0.3
Rolling resistance coefficient	0.005	0.005
Wheel's	2-Front 2-Rear	2-Front 2-Rear
Rotational Inertia	1.1	1.1
Rotor Resistance	1.8ohm	1.59ohm
Rotor Inductance	0.1568H	3.3m H
Stator Resistance	1.2ohm	0.05 ohm
Stator Inductance	0.1558H	0.30m H
Mutual Inductance	0.15H	0.14H
Moment of inertia	$0.07kgm^2$	$2.7kgcm^2$
Max Speed	2890RPM	1500RPM
Max Torque	20Nm	21Nm
Specifications	2kw, p=2,	50kw, p=4,
Rated Voltage	380V, 50Hz	30V

Table1: - Difference between motors

The above table shows the difference between 3 phase induction motors & Permanent Magnet Synchronous Motor which is used in PHEV. Based on the type of vehicle and road, therequired motor is used. And based on the steer like Understeer and oversteer motors are chosen and placed either front or back. The ratings of the machine will be changed based on the requirement [5].

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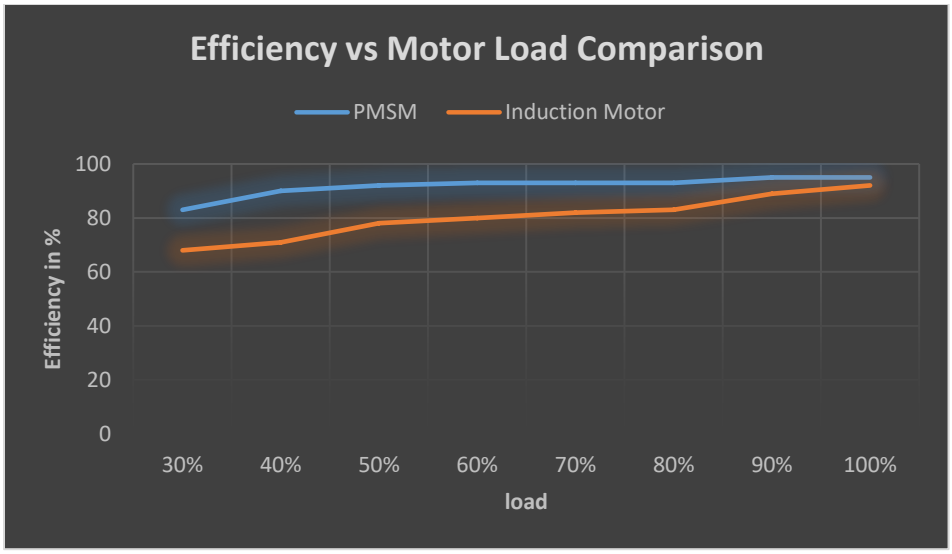

Fig3: - Efficiency of motors

The above figure shows the graphical representation of efficiency between 3 phase induction motors & Permanent Magnet Synchronous Motor (PMSM). Hence by using PMSM in PHEV's the efficiency of a vehicle can increase and it has better speed and torque compared to an induction motor [6-10].AWD technique is using instead of two-wheel drive or four-wheel drive. In AWD technology all four wheels are in rotating simultaneously according to the required friction to the dedicated wheel. So that the slippery of the vehicle is controlled on ice roads, mountain roads,etc. [11-14].

Items	Reference Paper (2)	Reference Paper (6)	Current Paper
Type of Battery	Li-ion	---	Li-ion (NCA)
Battery Capacity (kWh)	2.8	2.5	100
BatteryVoltage	96V	360V	300V
Type of Motors used	---	PMSM	PMSM & 3phase IM
Type of Drive	2-wheel drive	2-wheel drive	All-wheel drive with PMSM & 3phase IM
Vehicle run type	Battery & Fuel	Battery & Fuel	Battery & Fuel

Table2:- Comparison for old and new model vehicle

The above table shows the values of the old project and current project, and they rating. The ratings of a vehicle is placed in above table. Here the solar panel is used to charge the battery, and the range of the panel is maximum power-250W, open circuit voltage-37.8V, short circuit current-8.7A.

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2. Simulation Results

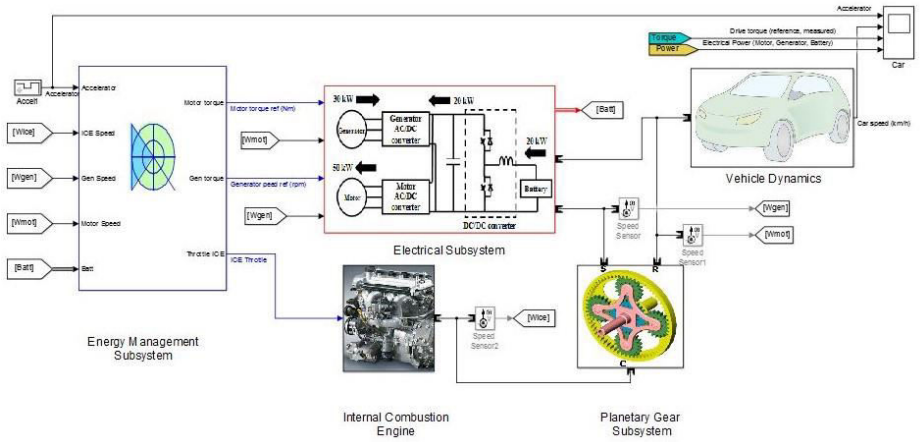

Fig4: - Mat LAB work

The above figure shows themat LAB work of the proposed system.

3. Simulation output

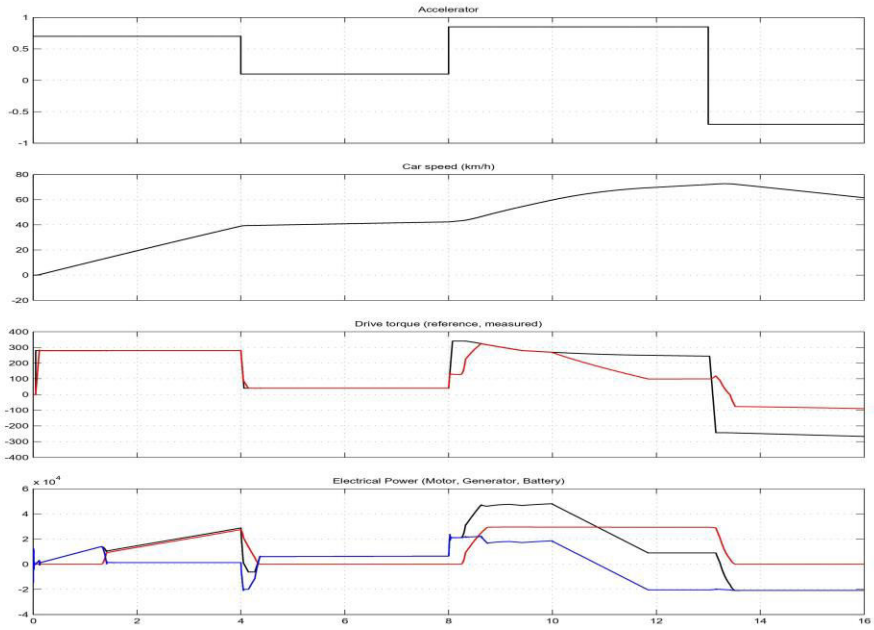

Fig5: - Output of the System

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The above figure shows the output waveforms of the PHEV.

	Accelerator	Car Speed (km/h)	Drive Torque		Electric Power		
			Reference	Measured	Motor (Black line)	Generator (Red line)	Battery (Blue line)
0	0.75	0	0	0	0	0	1.8
2	0.75	20	290	290	1.8	1.8	0.1
4	0.1	40	50	80	0	2.90	0.1
6	0.1	40	50	50	0.4	0	0.95
8	0.9	42	350	140	2	0	2.20
10	0.9	60	280	280	5	3	1.95
12	0.9	70	250	100	1	3	-2.0
14	-0.65	70	-250	100	-2	0	-2.0
16	-0.65	62	-280	-90	-1.95	0	-2.0

Table3: - Numerical form ofthe output of the System

The above table shows the numerical values of the simulation output of a project. The vehicle will run according to the values shown in the above table.

4. Conclusion

This project explains that the increasing sources of charging of the battery and how the Plug-In Hybrid Electric Vehicle runs with battery source and with fuel. So that without stopping the vehicle, the vehicle can travel more distance. Whenever the vehicle is running with the help of fuel, the battery is charged with the help of an electrical machine present in a vehicle. And the battery gets charged automatically when the solar energy is present.

5. Reference

1. K.P.M.Y.V. Dathu, R. Hariharan, Modelling of plug-in hybrid electric vehicle (PHEV) with multi source. In materials today: proceedings. https://doi.org/10.1016/j.matpr.2020.10.215
2. Cheng R, Dong Z (2015) Modeling and simulation of plug-in hybrid electric powertrain system for different vehicular application. In: IEEE Veh power propulsconf VPPC proc. https://doi. org/10.1109/vppc.2015.7352976
3. Eshani M, Gao Y, Gay S, Emadi A (2010) Modern electric, hybrid electric and fuel cell vehicles, 2nd edn. CRC Press, Boca Raton
4. Taylor DG (2014) Systematic approach to the modeling and control of hybrid electric vehicle powertrains. In: IECON 2014—40th annual conference of the IEEE Industrial Electronics Society, pp 3060–3065
5. ElMenshawy M, ElMenshawy M, Massoud A, Gastli A (2016) Solar car efficient power converters' design. In: 2016 IEEE symposium on computer applications & industrial electronics (ISCAIE). IEEE, pp 177–182
6. Denis N, Dubois MR, Trovao JPF, Desrochers A (2018) Power split strategy optimization of a plug-in parallel hybrid electric vehicle. IEEE Trans VehTechnol 67:315–326. https://doi.org/ 10.1109/TVT.2017.2756049
7. Butler KL, Ehsani M, Kamath P (1999) A Matlab-based modeling and simulation package for electric and hybrid electric vehicle design. IEEE Trans VehTechnol 48:1770–1778. https:// doi.org/10.1109/25.806769
8. G. Rizzoni, L. Guzzella, and B. M. Baumann, "Unified Modeling of Hybrid Electric Vehicle Drivetrains," IEEE-ASME Transactions on Mechatronics, 4(3): 246-257, 1999
9. P. Tulpule, V. Marano, G. Rizzoni, "Effects of Different PHEV Control Strategies on Vehicle Performance", Proceedings of 2009 American Control Conference, 3950-3955, 2009

ISSN:0975-3583,0976-2833 VOL12,ISSUE05,2021

10. dSPACE ASM – Gasoline Engine Simulation Package, 2008; available from (accessed 2015):http://www.dspaceinc.com/ww/en/inc/home/products/sw/automotive_simulation_models/asm_gasoline_engine_sim ulation.cfm
11. Ananthichristyetal.,Modified Hybrid Multilevel Inverter With Reduced Number Of Switches For Pv Application With Smart Iot System,2018;1-13
12. Ananthichristyetal, A modified inductor and control models of three phase Vienna rectifier topology using particle swarm optimization algorithm,2020,doi.org/10.1007/s12652-020-02179
13. A.Ananthichristyetal, Performance analysis of a Nonlinear system with reduced Total Harmonic Distortion (*THD*) based Hysteresis Current Controller (*HCC*) using 3 phase DC/AC,IEEE International Conference on Computational Intelligence for Smart Power System and Sustainable Energy (CISPSSE-2020)
14. A.Ananthichristyetal, Photovoltaic Based Brushless Dc Motor Using Cuckoo Algorithm As A Maximum Power Point Tracking,2020., IEEE International Conference on Computational Intelligence for Smart Power System and Sustainable Energy (CISPSSE-2020)