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A 80-KW ISOLATED DC-DC CONVERTER FED ENLISTMENT MOTOR DRIVE FOR RAILWAY APPLICATIONS

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ABSTRACT

The dual active bridge (DAB) topology as an appealing contrasting option to full-connect topology. In examination with the traditional full extension topology, the yield inductor is exchanged to the air conditioner side, and is in arrangement with the spillage inductance. Thus, the vitality in the spillage inductance is exchanged to the heap without causing reverse recuperation misfortunes in the yield diodes. This permits higher exchanging frequencies and, along these lines, an expansion in control thickness. In this undertaking three-stage double dynamic extension (DAB) topology utilized as high-control thickness dc– dc converter for railroad applications. The three-stage DAB is broke down concerning the present interims, the yield control, and delicate exchanging locale, including the effect of zero-voltage exchanging capacitors. Moreover, two measures are proposed to accomplish delicate exchanging in the whole working extent, being assistant inductors and a clear exchanging procedure called the burst mode. Ideal part esteems are ascertained to limit misfortunes in the total working extent and to survey which measure is most appropriate. The reenactment comes about are introduced by utilizing Matlab/Simulink software.

Index Terms DC–DC power conversion, power electronics, power supplies, rail transportation electronics.

I. INTRODUCTION

Solar vitality is the most ease, rivalry free, general wellspring of vitality as sun sparkles all through. This vitality can be changed over into helpful electrical vitality utilizing photovoltaic innovation. The enduring state decrease of cost per crest watt and straightforwardness with which the introduced power can be expanded by including boards are alluring highlights of PV innovation. Among the numerous uses of PV vitality, pumping is the most encouraging. In a PV pump stockpiling framework, sun oriented vitality is put away, when daylight is accessible as potential vitality in water store and expended by request. There are preferences in maintaining a strategic distance from the utilization of substantial banks of lead corrosive batteries, which are overwhelming and costly and have one fifth of the lifetime of a PV board. A number ofsimulation DC engine driven PV pumps are now being used in a few sections of the world, however they experience the ill effects of support issues

because of the nearness of the commutator and brushes. Henceforth a pumping framework in view of an enlistment engine can be an appealing proposition where unwavering quality and upkeep free operations with less cost are critical. The powerful operation of Induction engine depends on the decision of appropriate converter-inverter framework that is bolstered to Induction Motor. For PV applications like pumping these converters could make a decent showing with regards to as pumping is completed at high power. In this way another push pull converter which is two switch topology can do equity by giving a high power all through. The Induction Motors are the AC engines and thus from converter, an inverter framework is likewise required to get an AC voltage. This inverter is picked in view of its points of interest and it is nourished to acceptance engine. Photovoltaic innovation is a standout amongst the most encouraging for circulated low-control electrical age. The unfaltering lessening of cost per top watt over late years and the effortlessness with which the introduced power can be\ expanded by including boards are some of its appealing highlights. Among the numerous utilizations of photovoltaic vitality, pumping is a standout amongst the most encouraging. In a photovoltaic pump-stockpiling framework, sun oriented vitality is put away, when daylight is accessible, as potential vitality in a water store and after that devoured by request. There are points of interest in keeping away from the utilization of substantial banks of leadacid batteries, which are overwhelming and costly and have one-fifth of the lifetime of a photovoltaic board. It is critical, in any case, that the nonappearance of batteries does not trade off the proficiency of the conclusion to-end control change chain, from boards to mechanical pump. Photovoltaic boards require particular control procedures to guarantee operation at their greatest power point (MPP). Impedance coordinating issues imply that photovoltaic exhibits may work pretty much proficiently, depending on their

II. TOPOLOGY OVERVIEW

The field of high-control thickness dc– dc converters has been tended to regularly in the most recent decades. From the earliest starting point, the regular full-connect converter topology has been the favored decision to understand a high-control dc– dc converter [1].However, because of issues with the spillage inductance of the transformer and, therefore, invert recuperation misfortunes of the yield diodes, the most extreme exchanging recurrence is restricted. To take care of this issue, a few arrangements were introduced ,counting dynamic clasps as well as assistant circuits [2]– [4]. These arrangements empower higher exchanging frequencies to the detriment of extra segments and could prompt higher gadget stress.The extra segments block the expansion in control thickness and expanded multifaceted nature, while the productivity is regularly worse contrasted with other zero voltage exchanging (ZVS) and zero-current exchanging (ZCS) systems. Resounding converter topologies offer and power densities [5]– [7]. The arrangement full or LLC converter gives a heap autonomous

working point with solidarity voltage pick up at an exchanging recurrence close to the reverberation recurrence [6], [8]– [10]. In any case, this Load free working point is lost when the info and additionally yield voltage changes, and exchanging recurrence control is important to manage the yield voltage. In this way, a lift converter can be utilized to manage the information voltage keeping in mind the end goal to ensure operation in the heap autonomous working point [10], [11]. On the other hand, the reverberation circuit can be impacted by a switch controlled capacitor, bringing about settled recurrence operation [12]. In spite of the gave arrangements, the LLC converter still experiences high rms stage streams, requiring a moderately huge arrangement full capacitor that prompts a diminished power thickness. The extra lift converter or switch-controlled capacitor likewise disintegrates the power thickness and proficiency. The double dynamic extension (DAB) topology presented in [1]is an appealing other option to the issues with the Classical full-connect topology. In correlation with the traditional full extension topology, the yield inductor is exchanged to the air conditioner side, and is in arrangement with the spillage inductance. Thusly, the vitality in the spillage inductance is exchanged to the heap without causing reverse recuperation misfortunes in the yield diodes. This permits higher exchanging frequencies and, along these lines, an expansion in control thickness. Besides, the utilization of a dynamic yield connect additionally builds the power thickness of the transformer [1]. At the point when the coveted inductance can be fused in the transformer, again the power thickness can be expanded. In [13], high power densities, up to 11.13kW/L, are accounted for. A three-stage DAB, likewise proposed in [1], has a few preferences in contrast with the single-stage DAB. The three-stage DAB has bring down kill streams in the switches and lower rms ebbs and flows per stage. Likewise, the VA evaluations for the information and yield channels are fundamentally lower and can even go to zero because of the three-stage attributes. Other than the lower VA evaluations, the successful swell recurrence of the channel streams is three times higher, permitting to utilize littler channels. Contrasted with the single stage DAB, the streams through the transformer windings are substantially more sinusoidal, bringing about decreased high recurrence misfortunes in the transformers [14]. A complete examination of single-stage and three stage DAB topologies is given in [1].Both the single stage and three-stage DAB topologies experience the ill effects of a restricted delicate exchanging range in the event that theinformation voltage and the reflected yield voltage are not equivalent. For the single-stage DAB, there exist exchanging procedures or regulation plans for expanding the delicate exchanging range are portrayed. Here, the delicate exchanging working extent is expanded and furthermore the general effectiveness can be expanded with a base misfortune adjustment procedure. The three-stage DAB does not have these worthwhile exchanging conceivable outcomes. The stage move point φ between the scaffold

voltage is the main control variable as the symmetrical properties of the three-stage framework must be kept up [14].Although the three-stage DAB has less exchanging conceivable outcomes, contrasted with the single-stage DAB, and incorporates four additional switches, the topology has the most favored properties for outlining a powerful thickness segregated dc– dc converter. It has the most minimal segment evaluations and is equipped for accomplishing higher yield powers with perhaps the most noteworthy power thickness. For APU applications in light rail vehicles, high power capacity and power thickness are definitive. In this way, the three stage DAB topology is selected in this study

III. THREE-PHASE DAB DC–DC CONVERTER

The three-phase DAB, shown in Fig. 1(a), consists of two three-phase bridges coupled with a three-phase transformer connected in Y–Y. The bridges are operated in six-step mode at a constant frequency. By applying a phase shift between the input and Output Bridge, the power flow can be controlled. Because the converter is symmetrical from input to output, bidirectional power flow is possible. The transformer leakage inductances are used as current transfer elements and, therefore, not considered as parasitic. If the magnetizing inductance Lm is neglected, an equivalent circuit can be used for analysis. from the primary side is connected between the phase legs from the input and output bridge. The corresponding idealized waveforms In this circuit, only the total leakage inductance Ls seen.

VI.CONCLUSION

This work has evaluated the strategy for utilization of PV Cells for induction motor pumping. The electricity bill gets reduced since solar energy is utilized for agriculture pumping. The Photo Voltaic powered three phase induction motor drive system is successfully designed, modelled and simulated using Matlab/ Simulink. The concept of Photo Voltaic pumping is proposed. The simulation results of three phase induction motor for Photo Voltaic pumping are presented. The simulation results are in line with the theoretical results. The scope of this work is the simulation and implementation of three phase PV Powered Induction motor drive system.

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