

Impact of Direct Current High Voltage in Three-Level Converters for different areas: Case Study

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Abstract: In this paper we have discussed about the working of three phase high voltage direct current in many fields. The derivation of High voltage TL converter is extended to all DC-to-DC converters, and families of TL converters are proposed in this paper. And High voltage Direct Current allows to power transmission between AC System by distribution systems, and it can increase system stability by preventing cascading failures due to phase instability from propagating from one part of a wider power transmission grid to another. And high-voltage direct current electric power transmission system used in direct current for the bulk transmission of power supply, and here we show the all areas where we used the power transmission of common alternating current systems.

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Introduction

Here an AC system, voltage conversion is simple. An AC transformer allows high power levels and high insulation levels within one unit, and has low losses. It is a relatively simple device, which requires little maintenance. Further, a three-phase synchronous generator is superior to a DC generator in every respect. For these reasons, AC technology was introduced at a very early stage in the development of electrical power systems. It was soon accepted as the only feasible technology for generation, transmission and distribution of electrical energy. [1] There are significant challenges to improve overall efficiency of the converter; resulting in reduction of size and cost. The converter as part of the house keeping power supply is required to provide power to vital loads. This provides uninterrupted power to mission-critical loads to allow the ship to “fight through” a damage situation. [2] The land coverage and the associated right-of-way cost for an HVDC overhead transmission line is not as high as that of an AC line. This reduces the visual impact and saves land compensation for new projects. It is also possible to increase the power transmission capacity for existing rights of way. [1]

The auxiliary power supply converter (APS) is one of the basic systems used in rolling stock. It provides low-voltage power to every onboard electrical system and equipment on a rail vehicle, including those that are critical to its safety and operability (like brakes or lighting systems). In brief, APS represents a step-down DC/DC converter, transforming high voltage from the traction catenary to a lower voltage (350 V DC) for the onboard electric facilities. It is obvious that a failure within this system would render the whole vehicle nonoperational, resulting in a financial loss, operational problems to the rolling stock owner and discomfort to passengers. [3]



Figure (a) [1] by SIEMENS

Use of Three Level Converters in different Areas

Three-level converters were proposed in numerous configurations. And it is preplanned for the function. The diode-clamped three-level converter, also known as the neutral point clamped multilevel converter, the flying-capacitor Three-level converter, further known as the imprecated cell converter, and the cascaded Three-level converter [4].

Three level Conduction losses comparison

In three levels Conduction losses occur while the power device is in the on-state and is conducting the current. They are dependent on the modulation index and power factor. [4]

Uses of HVDC Converter in different Areas

Electronic converters for HVDC are divided into two main categories. *Line-commutated converters* are made with electronic switches that can only be turned on. *Voltage-sourced converters* are made with switching devices that can be turned both on and off. Line-commutated converters (LCC) used mercury-arc valves until the 1970s, or thyristors from the 1970s to

the present day. Voltage-source converters (VSC), which first appeared in HVDC in 1997, use transistors, usually the Insulated-gate bipolar transistor (IGBT). [5]

Composition Targets

Some particular targets are: [2]

- Selection of highly efficient converter topology,
- Use of lowest turn-on resistance MOSFETs, which can be found in a SOT-227 package,
- SOT-227 Schottky diode module (150V-110A) in parallel to reduce the conduction loss,
- Compact packaging of the power components to minimize leakage inductance,

Conclusion

Here we study about the all three level converters in direct voltage direct current and in this the specified the all losses and composition targets of the three level converters which is convert the DC- to DC voltage. It is show the highly efficient converter topology and use of lowest turn on resistance. And reduce the conduction loss. So lastly the conclusion is that it is specified the module which is convert the

power supply in different areas and easy and efficient way.

References

- [1]. High Voltage Direct Current Transmission – Proven Technology for Power Exchange By SIEMENS Report.
- [2]. Byeong-Mun Song, Robert McDowell, and Andy Bushnell, “A Three-Level DC-DC Converter with Wide-Input Voltage Operations for Ship-Electric-Power-Distribution Systems”, IEEE Pulsed Power Conference June 2003.
- [3]. Dmitri Vinnikov, Juhan Laugis, “An Improved High-Voltage IGBT-Based Half-Bridge Converter for Railway Applications”, MC2D & MITI March 2009.
- [4]. Hag Ahmed Y., Zhengming Zhao & Ting Lu, “comparison and analysis of three-level converters versus two-level converters for ship propulsion applications”, IJRRAS Volume 11 issue 2, May 2012
- [5]. http://en.wikipedia.org/wiki/HVDC_converter With www.google.co.in

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