

Mini Review Paper

Miscellaneous applications of DC-DC converters

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Abstract

DC-DC converters are majorly used for various purposes in power electronics. In literature various attempt has been done to improve topology of various kind of dc-dc converters. DC-DC converter are using for various application in different fields of power electronics. The aim of this paper is to present some miscellaneous application of dc-dc converters in telecommunication, photovoltaic cell, renewable energy sources and SiC devices and arc welding.

Keywords: DC-DC converter, Telecommunication, renewable energy.

Introduction

DC-DC converters are the power circuits that convert direct current voltage from one level to other. These converters act as switching converters. Topology of DC-DC converters varies according to their application. DC-DC converters used in portable devices to aircraft power system. So the applications of these converters play important role in power electronics¹⁻³.

DC-DC converters in telecommunication

There are two options for the implementation of high efficiency isolated dc-dc converters with high output voltage for TWTA were proposed and studied^{4, 5}. In this paper they created two operation stages for to develop efficient circuits (figure.1 and 2). Similarly there is some photovoltaic DC-DC converters used for telecommunication.

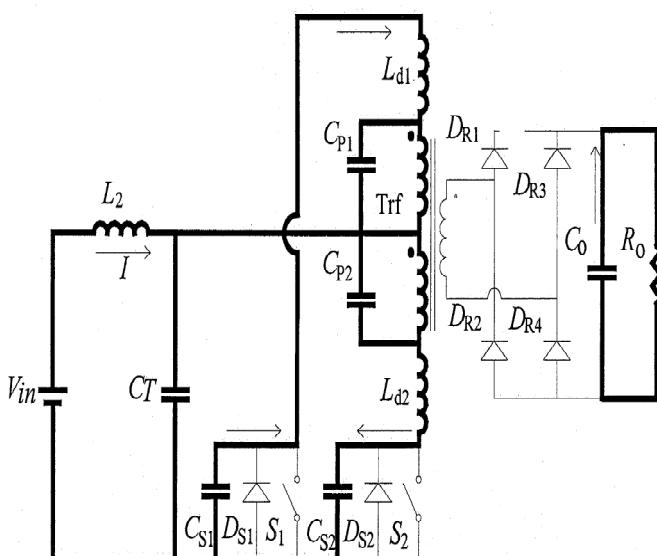


Figure-1
First operation stage (t_0-t_1)

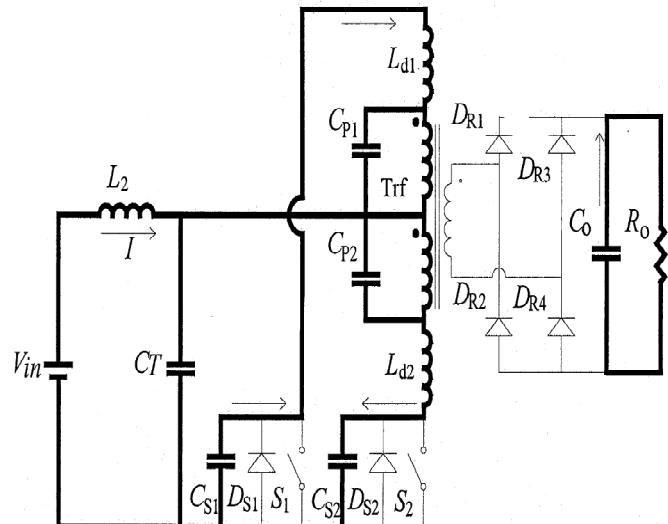


Figure-2
Second operation stage (t_1-t_2)

Hybrid Electrical Vehicles

In hybrid electrical vehicles isolated bidirectional dc-dc converters (IBDC) are used to improved the efficiency of these equipment⁶. Transformer play important role in providing isolation in these types of bidirectional DC-DC converters. Similarly Three-level bi-directional DC-DC converters have been investigated for charge station application⁶. DC-DC converters in photovoltaic application: Important components of photovoltaic cells are DC/DC and/or DC/AC converters, energy storage and control systems and control-measuring devices. DC/DC and DC/AC converters, these two components are a main part of a network-connected photovoltaic system. The main function of the converter is to increase the inverter DC voltage and convert the DC to AC domain^{7, 8}.

Use of DC-DC converters in SiC devices

In literature there are various approaches where attempt has been taken to exploit properties of dc-dc converters to make SiC devices. Bidirectional DC-DC converter based on high voltage SiC JFETs for a 1MW next-generation back-to-back system of a distribution system is presented and its analysis with comparison to a conventional Si system (figure-3)⁹.

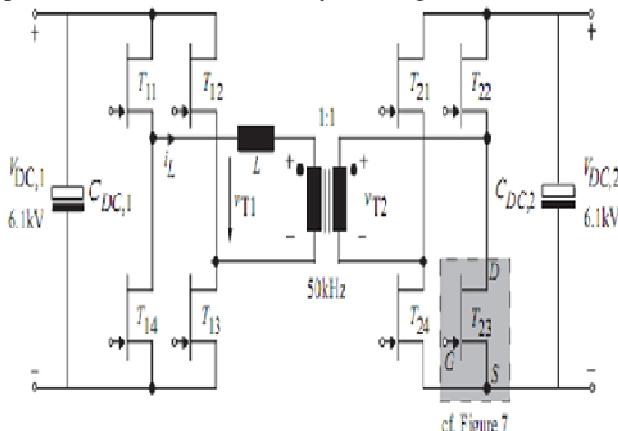


Figure-3
SiC high voltage DC-DC converter

DC-DC Converter for arc welding

Pulse-shifted pulse width modulation (PS-PWM) can be used in combination of soft-switching to the secondary side of high frequency transformer shown by Jaroslave (2006)¹⁰. In this paper they explain how IGBT transistors can be fit and seems suitable with full bridge inverter and output power controlled by rectifier made up of two snap-off diodes one by one in series with MOSFET transistors. It is also connected on secondary side of high-frequency power transformer. This topology can be helpful to achieve soft-switching operation under low commuting current (figure-4)¹⁰.

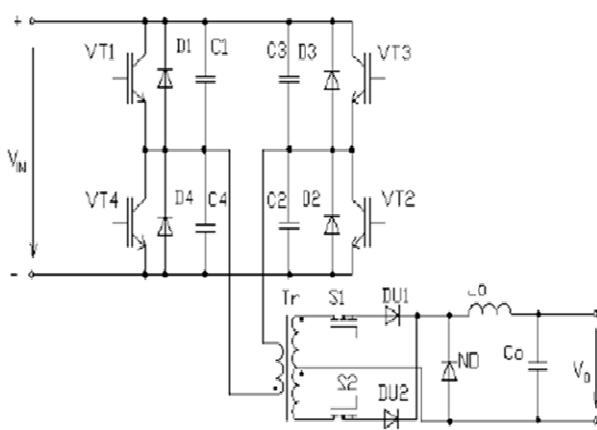


Figure-4
Scheme for DC-DC converter for arc welding

Conclusion

In this review article we have discussed some specific role of DC-DC converters in area of telecommunication, hybrid electrical vehicle, SiC devices and arc welding. Diversity of fields where use of DC-DC converter is going on is showed enormous application of simple DC-DC converter.

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