

Seminar 20 Monday June 18, 2001

EVOLUTION OF POWER ELECTRONICS, SWITCHING LOSS REDUCTION OF PT- AND NPT-IGBT AND A NEW COMMON MODE COMPENSATION TRANSFORMER 9:00am – 6:00pm

Instructor: Dr. Lutz Erhartt, Technical University Vienna, Austria

ABOUT THE INSTRUCTOR

Lutz Erhartt is theoretically and practically working for 12 years in the fields of power electronics at the technical university of Vienna and as free inventor. Mr. Erhartt has published 14 articles, holds 3 Austrian patents and pioneers two new trends in power conversion such as „Soft-Transition, High Efficiency Conversion Technology in the Medium and High Power Range“ and „Common Mode Compensated Inverter Circuits“.

CONTENTS

A brief overview of power electronics evolution shows a steady increase of the obtainable power - switching frequency - product, the reliability and the number of applications. A further increase of the switching frequency in the medium and high power range from presently a few kHz is linked with the reduction of the switching losses. Modern regenerative snubbers containing auxiliary devices are presented. The investigation of the switching loss reduction shows that the PT-IGBT is especially well suited for high frequency applications.

In inverter applications the common mode problematic rises with increasing switching frequency. The costs and the size of common mode filters lie in the same range as those of the inverter and the engines in electric drives have to withstand many times the DC link voltage. In some cases the inverter is supplied by a 50Hz transformer with small coupling capacitances in order to interrupt the common mode loop. This severe problem is poorly addressed in the literature. Here, the common mode equivalent circuit is derived and a very low cost very high reliability solution is presented.

• HIGH EFFICIENCY CONVERSION

- Evolution of power electronics from the thyristor to the modern power switches.
- Modern active snubbers for power switches in pole configuration.
- Switching loss reduction of PT- and NPT-IGBT.

• COMMON MODE COMPENSATION

- The inverter common mode equivalent circuit - a common mode disturbance voltage source stimulating a low damped series resonant tank.
- The compensation technique.
- Passive common mode compensation filtering with three winding transformer dimensioned for switching frequency.

WHO SHOULD ATTEND

This course is designed for power conversion engineers and technical managers who are involved in state-of-art power conversion.