ABSTRACT

Quasi-Resonant Converters (QRC) are fast replacing conventional PWM converters in high frequency applications. The salient feature of QRCs is that the devices are switched off at zero current or switched on at zero voltage so that the switching losses are zero in ideal conditions. This property imparts high power density and high efficiency to the quasi-resonant converters. Since the output of QRCs is regulated by varying the switching frequency of the converter, they are called frequency modulated zero voltage switching/zero current switching quasi - resonant converters.

The present work deals with the simulation and implementation of DC motor powered from zero current switching and zero voltage switching quasi-resonant converters operating in both half-wave and full-wave modes. The results of ZVS and ZCS QRC fed DC drive systems are compared. The armature current ripple of the resonant converter and the voltage commutated chopper fed DC drive systems are compared. The harmonics injected into the AC source by a QRC fed DC drive system are compared with those of a phase controlled converter fed DC drive system. A comparison between load commutated chopper and ZVS-QRC fed DC drive systems with respect to their switching losses is also made.

The open loop and closed loop drive systems are simulated using PSPICE and the results are presented. The closed loop drive system is
modelled such that the facilities of PSPICE can be extended to simulate the DC machine and the drive control system. Prototype ZCS and ZVS QRC fed DC drive systems are implemented and the results obtained from computer simulation are in agreement with experimental ones. It is observed that QRC fed DC drives have several advantages over those fed from phase controlled converters, DC choppers and PWM converters.