A New ZVT Snubber Cell for PWM-PFC Boost Converter

Introduction:
Energy consumption has been increasing by the effect of technological developments and rising prosperity, therefore energy should be used more efficiently and economical. The increasing nonlinear loads draw harmonic currents, which causes failures and corruptions on sensitive devices that are connected to the grid. Thus, energy should be used in a quality manner too. There are international mandatory standards about power factor and harmonics in terms of the use of energy with high quality and efficiency. Therefore, to cope with these standards, device manufacturers use various techniques known as power factor correction (PFC) circuits. Power factor can be improved by means of bulk passive filter or very complex and expensive active filters, but nowadays, academic and industrial applications focused on high-frequency ac–dc converter-based PFC circuits. Different approaches have been proposed to improve efficiency and quality of energy by using PFC.

Existing system:
Snubber cell proposed provides the turning ON of the main switch with ZVT and turning OFF with ZCT in wide-line voltage and load range. There is no additional current or voltage stress on the main switch and main diode. Stresses on the auxiliary semiconductor devices are considerably low. However, SS operation of the auxiliary switch decays because of leakage inductance.
**Proposed system:**

In this study, a new ZVT-PWM-CCM-PFC boost converter, which ensures most of the desired features and does not have most of the drawbacks listed above, is proposed. In the PFC boost converter equipped with new ZVT snubber cell, SS operation of all main and auxiliary semiconductor devices is provided. The switching energies are transferred to the output by using a transformer during ZVT operation, thus the current stresses of the auxiliary semiconductor devices are significantly reduced, and so the usage of sufficient capacitors for ZVS turning OFF of the main and auxiliary switches is ensured. The main switch and the main diode are not subjected to any additional voltage and current stresses. There is no additional voltage stress on the auxiliary switch. Moreover, this new converter can operate successfully at all rectified line voltage values and under all load conditions. The proposed converter has a quite simple structure, low cost, and ease of control.
Advantages:

- There is no additional voltage stresses on the auxiliary switch.
- There is no additional component on the main current path.
- There is no negative effect of the center-tapped transformer leakage inductance on the operation of the converter. Leakage inductance does not affect the operation or the performance of the converter.
- SS conditions are maintained at very wide line and load ranges.
- The total time of the transient periods is very short according to switching period.

Applications:

- High power conversion applications.

**Block diagram:**