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TO IMPROVE POWER QUALITY IN FLUX TYPES OF LOCK-FAULT CURRENT LIMITER BY VOLTAGE OR CURRENT CONTROLLED INVERTER

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ABSTRACT: *In this research, the flux-lock type superconducting fault current limiter (FCL) with integrated a voltage source inverter (VSI) been proposed controlled by the output voltage or current, operated to improve power quality investigated. The each superconducting fault current limiter capable recommended locked flux type, VSI, is limited short-term flows and failures. Flux key type circuit formed by the action of fault current limiter as well, because the current situation, or perhaps to compensate reactive power and energy supplement that uses a non-linear load required by the output voltage control of VSI operational management of electricity demand. (DSM) and uninterruptible power supply (UPS). The model suggested that the requirements set out, you have a different function. Such as the current limit fault analyzing and presentation through computer simulation, power quality improvement. Accuracy analysis, based on the benefits and limitations of the current control power quality the VSI computer simulation and control voltage and update operations, it is said to be confirmed by the results of the analysis.*

KEYWORD: Controls The Operation Of The Lock-Type Fault, Current Limiter, Improve Power Quality, Control Voltage Inverter And Power Supply Voltage**.**

INTRODUCTION

Failure of their own, which measured current and the superconducting current limiter (SFCL) and automatic recovery rapid implementation constraints, it is I have the most desirable advantage for FCL these characteristics. Current limiter, and the solid reaction FCL unit using electron energy, is expected to overcome the power shortage while fusing FCL [1] - [7] .the kind of flux, current limiting device which locks the FCL. [10] In addition, the integration of the flux-locked FCL - limited development of resistance in the current limiter, the operating current, can be set for induction and orientation double coil winding [8] It has been reported that. The supply voltage of the inverter through a maze (VSI), as well as the implementation of regular energy equipment, in case of a short circuit, has been introduced in practice limit the fault current. [11]

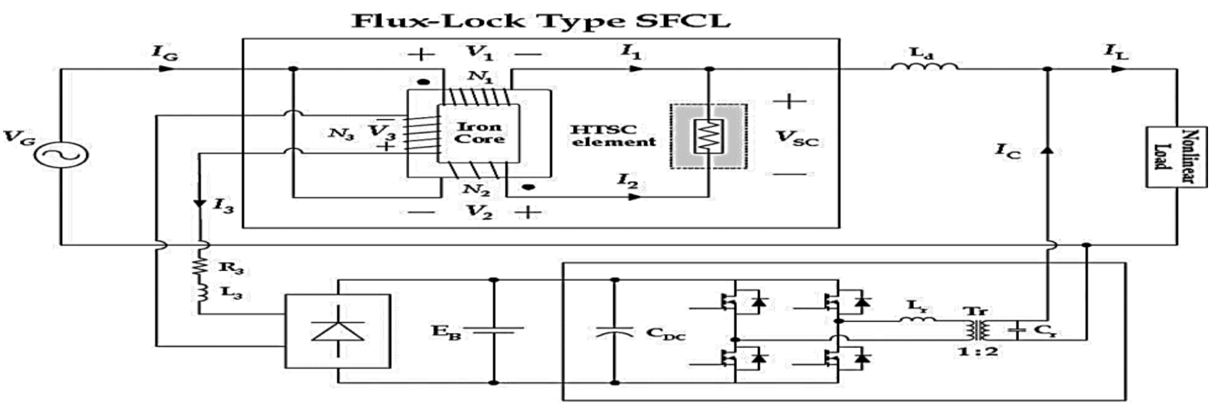

Fig1. Current control VSI flux locking structure is fault current limiter..

As the demand side (DSM) and uninterruptible power supply (UPS), as well as the improvement of power quality VSI, such as management of the implementation of energy equipment, influenced by VSI comparative study methods and operations. How integrated with VSI to control the flux of key types and current limiting device.

In this paper, improvement of power quality flux key type error current limiter, as a way to control the output of the monitor, integrated with VSI. The strength and quality of the power supply voltage or current control, with increasing shortages and behavior of each control method, and analyzed by computer simulation for feedback control, and compared with each other.

Voltage or current controlled voltage source inverter and FLUX-LOCK fault current limiter

Fig. 1 represents a flux locking fault current limiter, integrated voltage or current controlled VSI flux key type superconducting fault current limiter is configured to include a control winding and third VSI with voltage. Output is currently connected to a rectifier or winding of AC / DC converter. The through key type flux limiter fault current. It is possible to make a mistake at this time but it happens, if a short circuit occurs, the site rolls or flux locking fault current limiter as described in damage, F mention VSI on the device, TD aside induction and ULT equipped with constraints on the implementation of the current I limiting the operating fork.

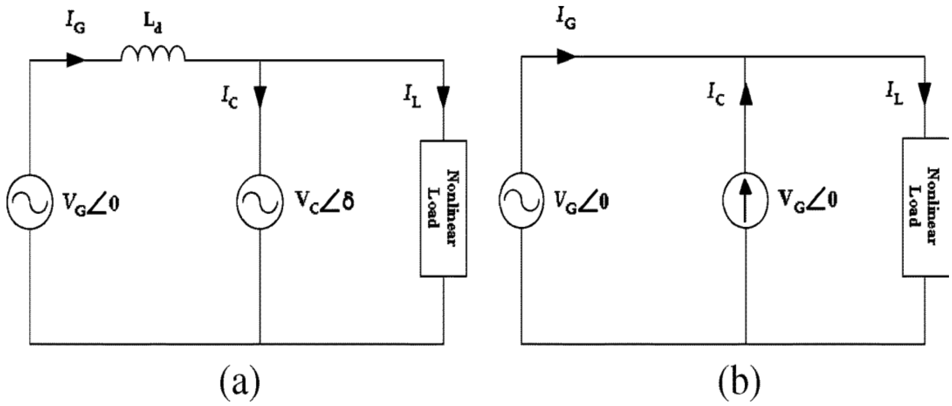

Fig. 2. In terms of power quality improvement VSI operate d by the simplified equivalent circuit voltage and current control (a) in the case of voltage control (b) in the case voltage regulator.

Performed as described in the resistance of the key HTSC flux type SFCL fault current limit operation is operated by the magnetic field in the core [8], [9], as seen in the pie. it's time to wrap sin rectifier battery can be charged with a third-place time of 1 AC / DC Rectifier to use instead of t he current time limit, battery charger fault [10] converts AC. / DC can be adjusted to control [11].

The margin of error when you can do something with the power quality control equipment, if VS VSI is operated by a control voltage, filter it () including inductance decoupling and full-bridge inverter. In contrast, the control is needed only if the passive and full bridge inverter induced [12] conducted by the VSI.

Thanks to the control voltage or current VS, t his device can perform the following power quality:

1) Grill the operation of the electric machine to load reactive power.
2) In the case of renewable energy sources (RES) by support active energy load) DSM is active in the power of the network load increases.
3) For continuous load on the electricity network will support the operation of the UPS.

Process of Voltage-Controlled VSI

In Fig. (2) Figure 2 which shows the ease of the equivalent circuit in the case of the VSI device, perform the operation quality of power through the control voltage (Vg) (VC) is a voltage source and the base. Each VSI (XD) and (lb), respectively, decoupling inductance resistor power and angle. By adjusting the output voltage is the phase (power), active power (PG) in accordance with the fundamental frequency to obtain from the current source (2) (Pg). And can be supplied with either load the VSI or reactive power of VSI (QC) to source voltage of the non-linear load to meet the needs of active power (PL). This path is referred to as light, can be given. T his operation is supported by the VSI UPS output voltage control as well.

Renewable energy sources (RES) is supplied with RES (PRES) by source (PG), it is possible to perform the operation, energy demand is assumed to be active non-linear useful load (PL). DSM device can be achieved by taking advantage of computing power (1) [12].

$$£=\text{Sin}^{-1}[-P_gX_d\,/VaVc]=\text{Sin}^{-1}[-(P_L-P_{RES})X_d/V_GV_C]\ldots\ldots\ldots(1)$$

Process of Current-Controlled VSI

Figure 2 (b), to control the VSI output current, can be modeled as a current source is shown to be operated by the circuit diagrams and flow control similar passive inductor VSI it caused decoupling requires not. The only VSI can be given that the remaining portion of the non-linear load current shows -CON- control applications, the assumption that the VSI controlled voltage non-linear loads in receiving the fundamental frequency of the current source is required

$$I_C=I_L-I_G{}^*=I_L-RC(IL)\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.\ (2)$$

Thus, part of the active power load can be [11] the person may be made by [12] RES to power, VSI control this time, it is possible to supply the rest of the active power, binding when it reacts. It loads the connection to the current control voltage source VSI as a source that would make possible direct support, and that is done by the implementation of DSM VSI, as can be do ne in the operating voltage of the UPS.

SIMULATION RESULTS AND DISCUSSIONS

Simulations performed using the integrated operating voltage or current control VSI flux-locked fault current limiter, and to compare the performance of the implementation of power quality and limits the current error. High resistance (TC) superconductors (HTSC) PSIM program as a curve to the data element modeling of resistance. (YaBa2Cu3O7-X) (YBCO) films reflect the model using the least squares method has been reported previously [10] shows the design parameters for the simulation in Table I. Figure 3 and Figure 4 shows the fire, hire guilty CUR to restrict the operation of VSI current control, occurred before the short circuit at

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0.25 seconds flux key type current limiting device when the integrated voltage or short circuit has occurred. This time can be seen as a sine wave pattern by VSI control operation when power to the voltage or non-linear loads that occur (IC). If the control voltage of the VSI can be a phase difference between the source and the load voltage to compensate the reactive power load of trouble, which is shown in Figure 3, the power factor is 1. On the other hand, VSI current control, reactive power, has been confirmed by 4 to compensate for factors power.

If a short circuit occurs, the operation, the power supply stops for the nonlinear load reactive power compensate on lost by a short circuit. However, it can be observed that the interference current limit is the birth of resistance containing HTSC species, after the accident flux occurs in the presence of a third co il in particular, locked superconducting fault current limiter I began to flow and (I_3)

TABLE 1: DESIGNED SPECIFICATIONS OF SHUNT REACTORS AND YBCO THIN FILM

Flux-Lock Type SFCL with Third Winding	Value	
Turn Number of Primary Winding (N_1)	60	
Turn Number of Secondary Winding (N_2)	24	
Turn Number of Third Winding (N_3)	84	
HTSC element (YBCO Thin Film)	**Value**	
Material and Manufacturing Form	YBCO, Thin Film	
Critical Current	15 A	
Normal State Resistance	25 Ω	
VSI, Output Filter and Others	**Value**	
	Voltage Control	**Current Control**
Switching Frequency of Inverter	10 kHz	10 kHz
Filter Inductance (L_r)	50 uH	3 mH
Filter Capacitance (C_r)	10 uF	0 uF
Turns Ratio of Transformer (Tr)	2	2
Battery Voltage (E_B)	200 V	200 V
DC capacitor (C_{DC})	2200 uF	2200 uF
Decoupling Inductance (L_d)	42 mH	0 mH
Series Resistance of Third Winding (R_3)	0 Ω	10 Ω
Series Inductance of Third Winding (L_3)	12 mH	12 mH
Source Voltage (V_G)	220 V_{rms}	220 V_{rms}

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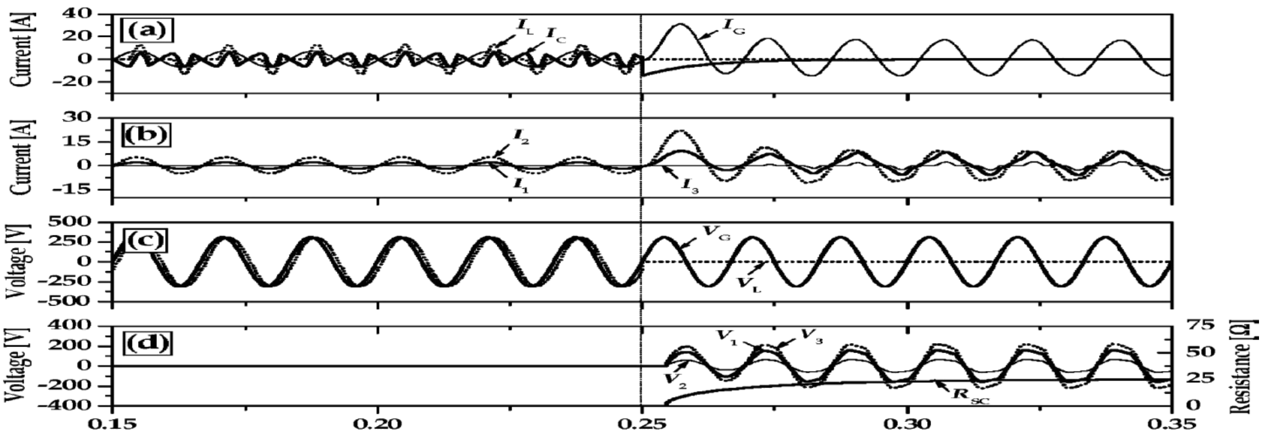
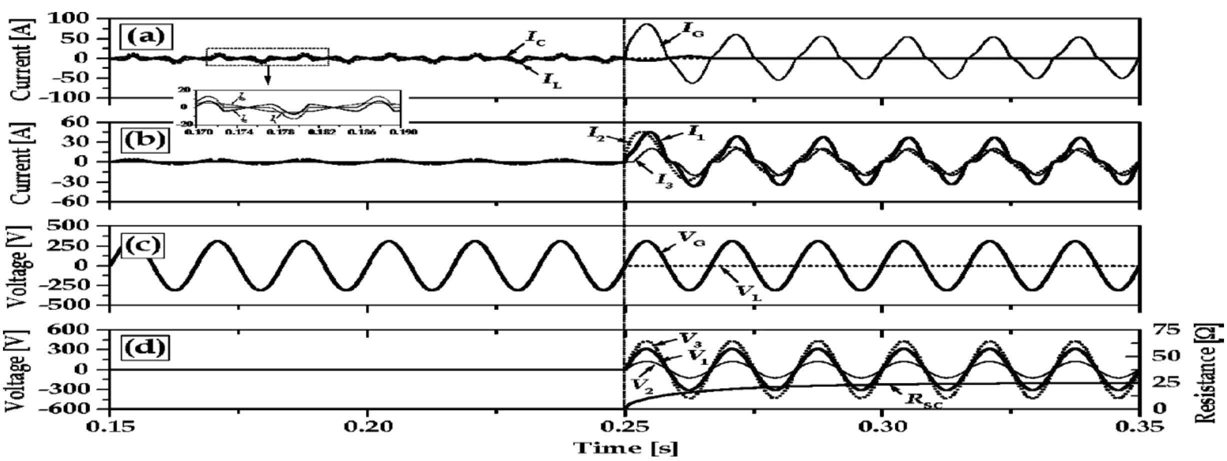


Figure 3. \mistake this time to limit the operation of the flux-lock type fault current limiter a) Electrical and integrated voltage controlled VSI load (B) The VSI and primary and secondary schools Coil third and elements of HTSC, the main 2 and the third coil and resistor and (C) the load source (D) voltage.

Charging the battery is connected to the third volume through the diode bridge. However, when the third accident somewhat distorted winding, non-linear characteristics of a diode bridge that affect the current wave of voltage or other coil power quality DSM another implementation for this type of flux, SFCL VSI control key while integrated voltage or current, the function of the observed increase in energy supply when the free space of the RES. 50% of the wave operation for the implementation of DSM VSI 0 percent, when operated by the voltage and current control are shown in Figures 5 and 6, respectively, in the two types of control methods, to observe VSI thing I could. Regardless, the available capacity o f RES is, active power (PL) and in the form of support VSI half of the total energy reactions, with voltage and current control to maintain voltage (VL). It is necessary to load (QL).Therefore,



Electric current limiter Figure 4 (a) integrated with the current VSI control, first, the fault current limiting operation load current flux flow type second and third key (b). Wind Inks (c) and load (d) resistor and the main pressure, HTSC element and the second and third coils.

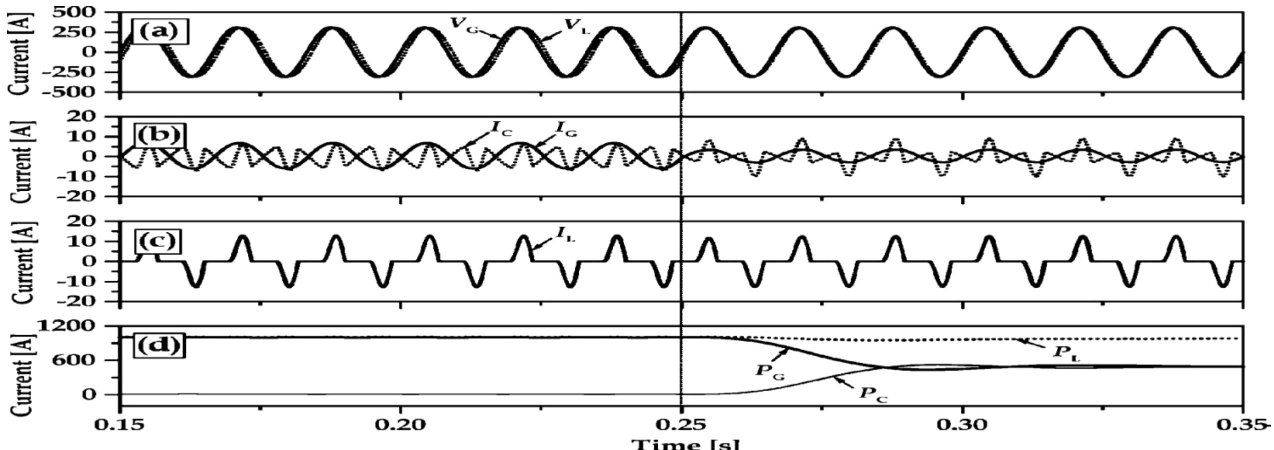


Figure 5. DSM flux-lock type SFCL with integrated voltage-controlled VSI (a) Source and Load (b) and VSI output CUR lease(c) is present load (d) the use of resources and load VSI.

Source current (IC) is reduced to half of its original value. The relationship between energy consumption between VSI and resources for load power requirements, as shown in Figure 5, the implementation of DSM VSI, two to gain control of (a) and Figure 6(d) I am using this method. It asserts that must be active.

To simulate the behavior of the integrated voltage or current control VSI source of failure and UPS flux key fault current limiter of this kind, I walked with 0.25 in the presence of a non-linear load and waveform math. In the case of the VSI controlled voltage and current limiter for both types of control, that is shown in Fig. 7 and 8, the voltage after the error occurs at 0.25, which is treated, it can be seen that energy. Performed by the control when the VSI in the case of fault current limiter, while, as shown n Figure 7, VSI by the response to the needs of preparation and did not receive the load voltage after the error. Support, believed to be caused by connecting directly to the source as can be seen in Figure 8. Through the operation of power quality analysis and fault current to limit the types of integrated magnetic flux key type error current limiter.

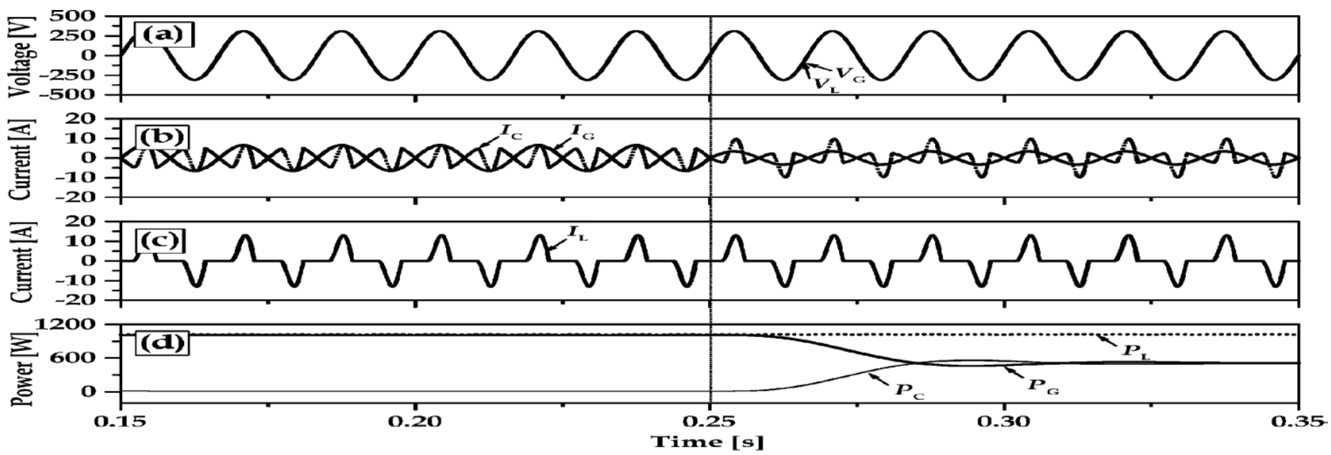


Figure 6. DSM flux key type error when limiter, source and load flow control VSI (a) (b) is, VSI output load current lease of CUR (C) (and integration .d), strength, and I use the VSI load .

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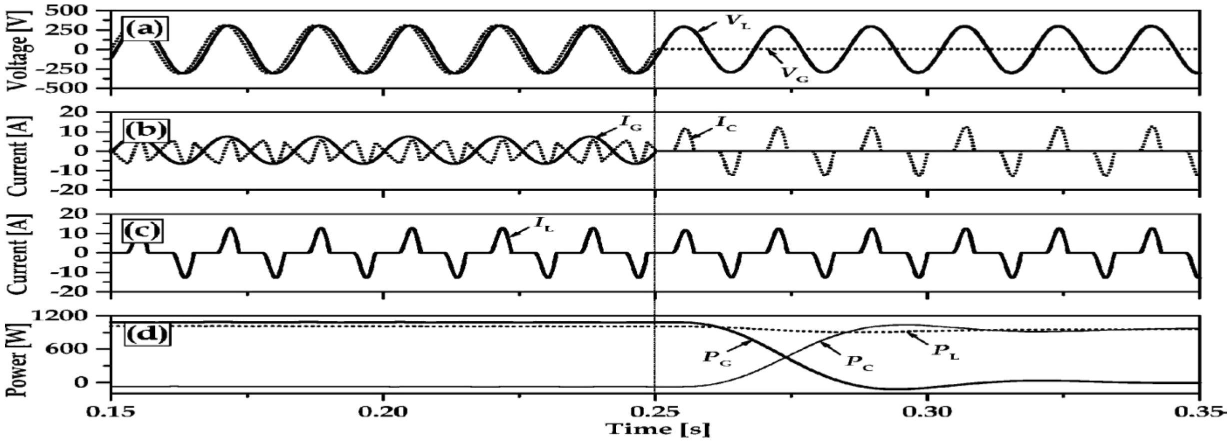

Figure 7. VSI () is the power integrated control operation voltage and flux-lock UPS load fault current limiter (B) and V SI source CUR rental yield (C) load current (D) of the source and load VSI use.

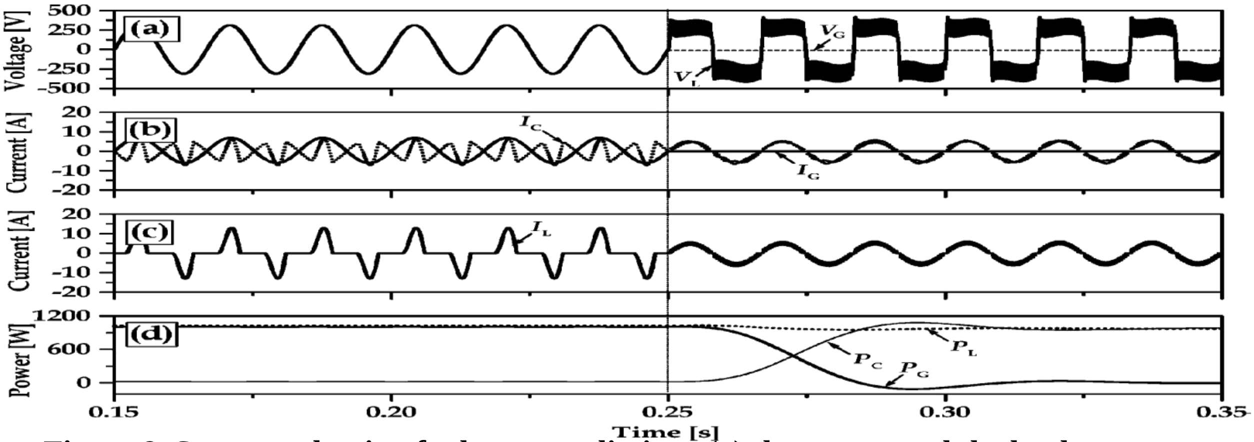

Figure 8. Superconducting fault current limiter, (a) the source and the load current control when (b) VSI is output t current (C) and integrated UPS flux key type operation loading the use of force (d), the burden of VSI.

VSI voltage or current is controlled, is expected to contribute to the expansion of the function as a means to improve power quality and fault current limiters.

CONCLUSIONS

In this paper, the flux-lock type SFCL integrated with the VSI controlled with its output voltage or current was proposed and its power quality improving operations and the fault cur-rent limiting operation due to the control method were compared through the computer simulation. The flux-lock type SFCL integrated with VSI, which was operated by both the voltage and the current controls, could perform the DSM operation, one of the power quality improving operations, and limit the fault current properly with the battery charge function through the third winding of the flux-lock type SFCL. However, in case of the power conditioning operation, the SFCL integrated with the VSI only controlling the VSI's output current could compensate the reactive power that the load required with unity power angle because of its direct connected structure of the source and the load. On the other hand, in case of the U PS operation, the SFCL integrated with the VSI only controlling its output voltage could more maintain the load voltage close to the source voltage than the SFCL integrated with the VSI controlling the current. Through the analysis for the computer simulation, the strong and the weak points of each control method for the various power quality improving operations including the protecting operation from the short circuit were compared each other.

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