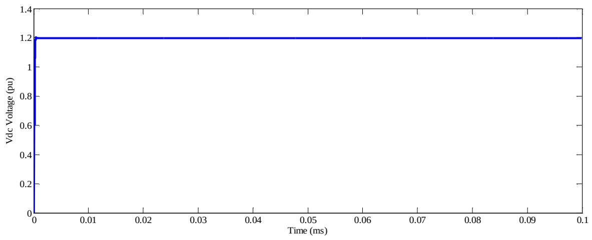

Fig. 7. Compensation of load voltage for SSC (Three-phase fault and short circuit power = 20 pu). Case 3.

Figure 7 shows the voltage generated by the SSC and the compensated load voltage, respectively. As a result of SSC, the load voltage is kept almost constant at 1pu throughout the simulation. Moreover, the figure shows the d-q components of load voltage and the DC voltage.

6. Conclusions

The study presented in this paper has been carried out by using numerical simulation. The simulation results have shown clearly the performance of the SSC for the compensation of voltage sags. The SSC has handled both balanced and unbalanced situations without any difficulties and has injected the appropriate voltage component to correct rapidly any disturbance in the supply voltage to keep the load voltage balanced and constant at the nominal value. Based on the simulation carried out, it is clear that a SSC can tackle voltage sags when protecting sensitive loads. If a voltage supply without zero-component is expected two identical controllers can be used with Park's transformation (one for the d-axis and another for the q-axis). However, a third controller (zero component) is required if situations with zero voltage component in the supply is expected.

Appendix

Parameters of the SSC test system:

- Electrical system viewed from the PCC: Short Circuit Power = 20 pu; Equivalent inductance = 157 μs; Equivalent Resistance = 0.007 pu;
- Distribution transformer and injected transformer: Short Circuit Power = 14 pu; Winding 1 Inductance = Winding 2 Inductance = 185 μs; Winding 1 Resistance = Winding 2 Resistance = 0.023 pu; Magnetizing Inductance = 63.66 s; Magnetizing Resistance = 1500 pu
- Filter Unit : Filter Inductance = 369.5 μs; Filter Capacitance = 55.98 μs-1
- Inverter Circuit: Switching Frequency= 4.95 kHz; Sampling Frequency=9.9 kHz
- Sensitive Load Apparent Power=1 pu; Power Factor = 0.93

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