## 3.2 SIMULATIONS FOR SRF CONTROLLED DSTATCOM:

Case 1: in this case the DSTATCOM is connected to a normal distribution line voltage level.

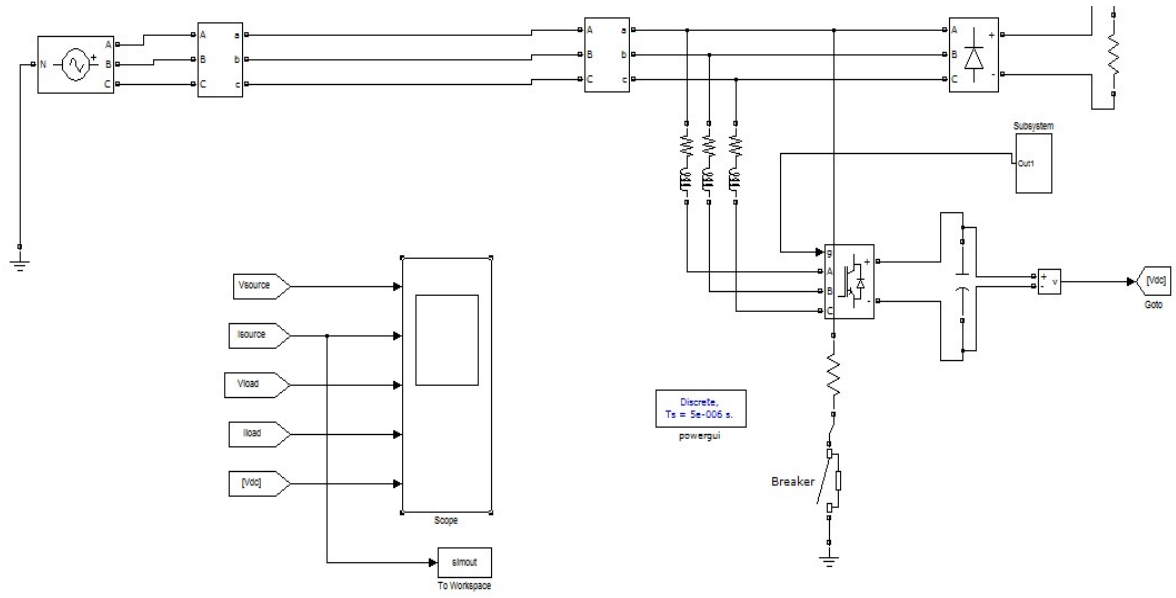


Fig 3.2 MATLAB Diagram of the proposed model

The controller MATLAB model is as follows:

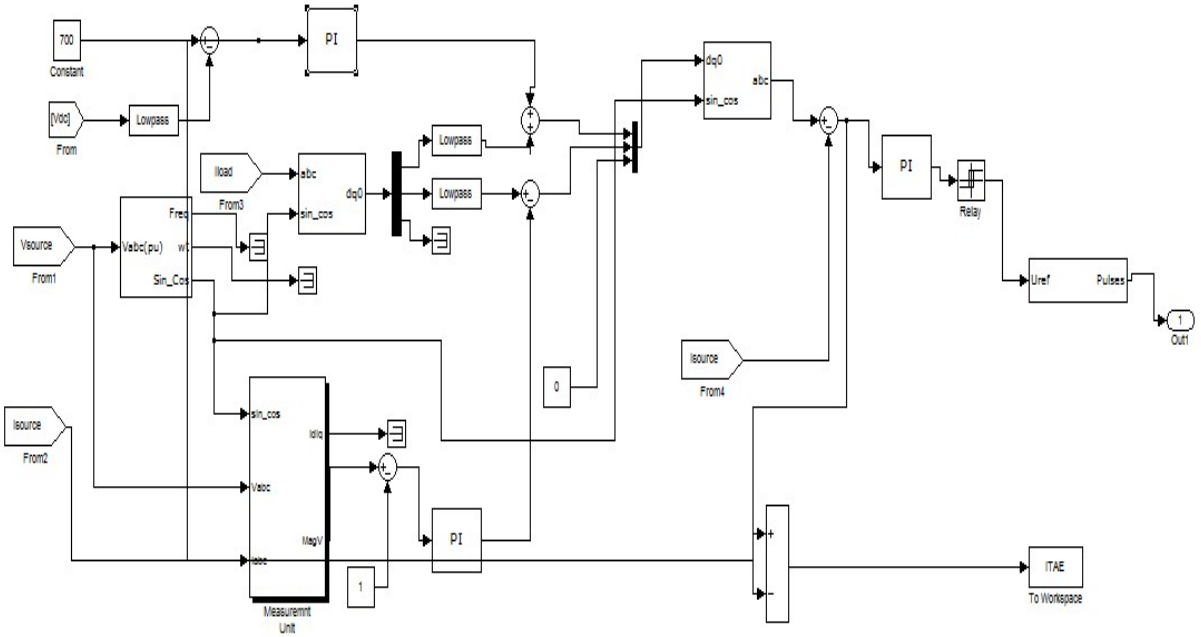

Fig 3.3 matlab block diagram of the controller

Simulation parameters:

Table 3.1

| | |
|---|---|
| Source voltage | 515 V |
| Inverter load | 10 KW |
| Extra load connected as a line to ground fault | 10 Ω |
| DC capacitor value | 2800e-6 μF |
| DC voltage across the capacitor | 700 V |
| Filter impedences | R=0.1 Ω, L= 3mH |
| Simulation time | 1 sec |

CASE 1:

The simulations have first been conducted without the DSTATCOM connected to the distribution network. An extra load of 10 Ω is connected to the line A through a breaker as shown in the figure. This extra load is switched ON at 0.7 sec and switched OFF at 0.8 sec. A nonlinear load i.e rectifier load of 10 KW is connected to the distribution line. This nonlinear load gives rise to harmonics in the source side as well as the load side current waveforms. These waveforms are shown below:

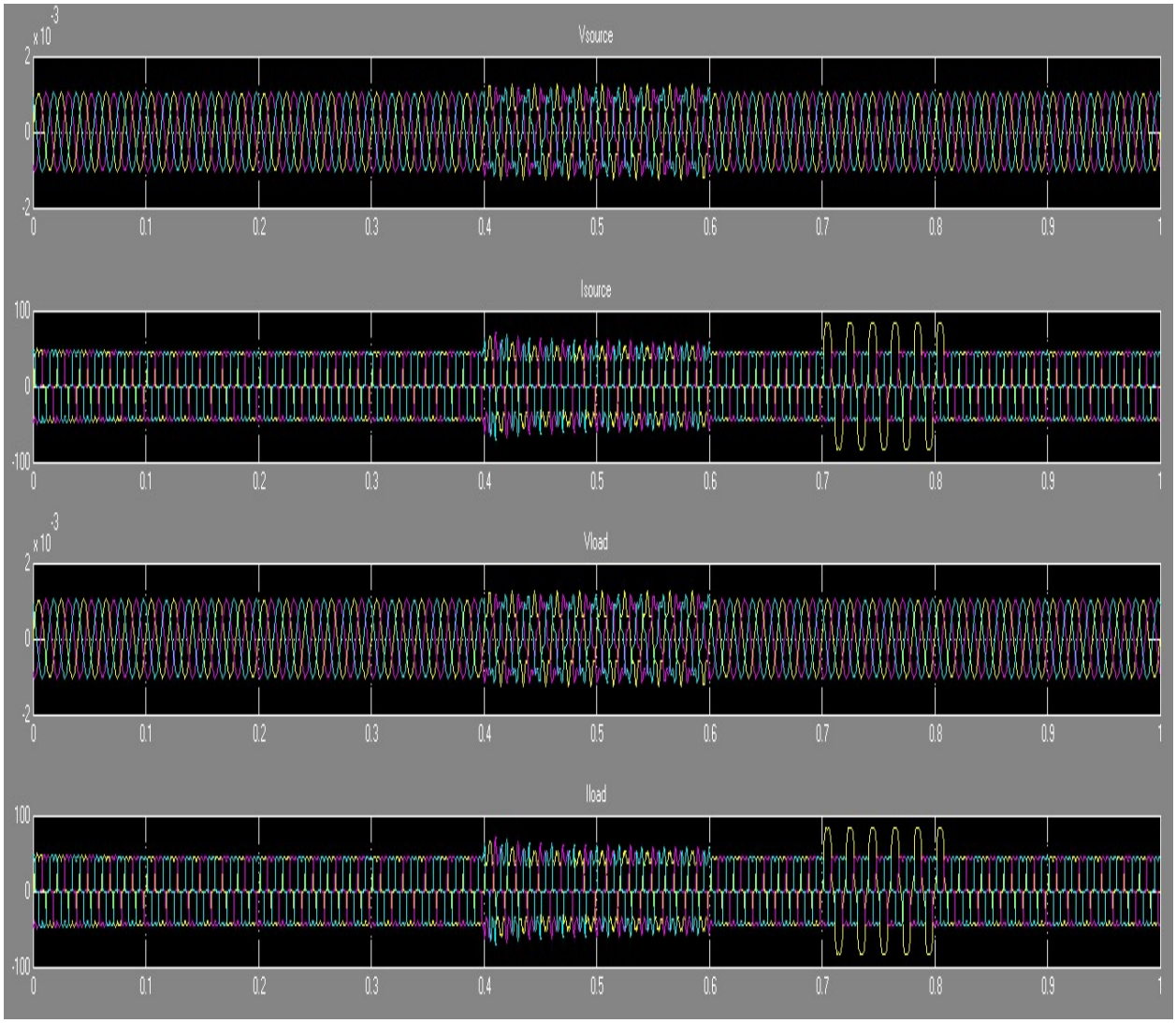


Fig 3.4 simulation diagram in the absence of DSTATCOM

In this figure it is seen that the load and source currents are disturbed, the cause of disturbance is basically because the source harmonics were injected during a time span of 0.4 sec to 0.6 sec. after this there is a sudden connection or switching ON of a load of 10 Ω during the time of 0.7 sec to 0.8 sec.

The simulation diagram in the presence of DSTATCOM is shown below:

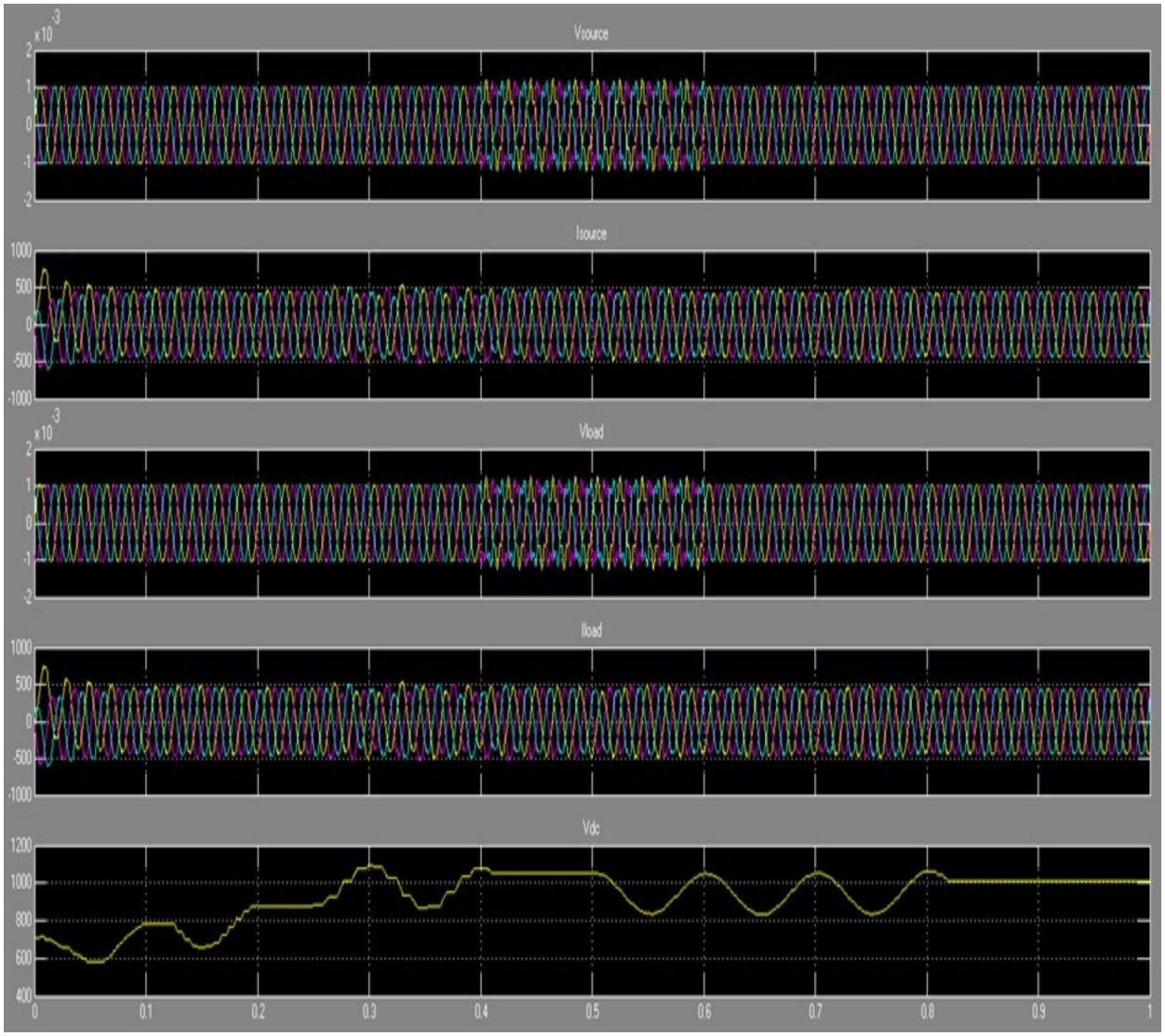


Fig 3.5 simulation plots in the presence of DSTATCOM

In this diagram the load and source current disturbances has been mitigated. The sinusoidal nature of the load and source currents has been restored. The DC voltage of the capacitor fluctuates till the control action of the DSTATCOM is completed. Once the control action is completed the DC capacitor waveform attains a steady value. This indicates that as long as there is a continuous process of charging and discharging of the capacitor the DSTATCOM helps in mitigating the harmonics. Once the DC voltage oscillations stop the DSTATCOM has already mitigated the harmonics phenomenon occurrence and has restored the sinusoidal nature of the load and the source waveforms.