The proposed converter has been validated in the MATLAB/Simulink environment using the following parameters in different test cases. The corresponding simulated results Fig. 9-11 are attached in pdf.

V_1=20 V, V_2=10 V, L_1=L_2=4 mH, C= 360 µF, C_1=470 µF, F=10 kHz. It verified in buck-boost, boost and buck mode of operation. The corresponding results output voltage, inductor current, voltage across capacitor, and device stress are shown in Fig. 9(a)-(c) respectively. In addition, it also verified in bidirectional mode operation, the corresponding results are shown in Fig. 9(d). Further, it is verified in different set of input voltages and duty ratio, the corresponding results are shown in Fig. 10. In addition, source failure case verified, the corresponding results are depicted in Fig. 10 and Fig. 11 respectively.

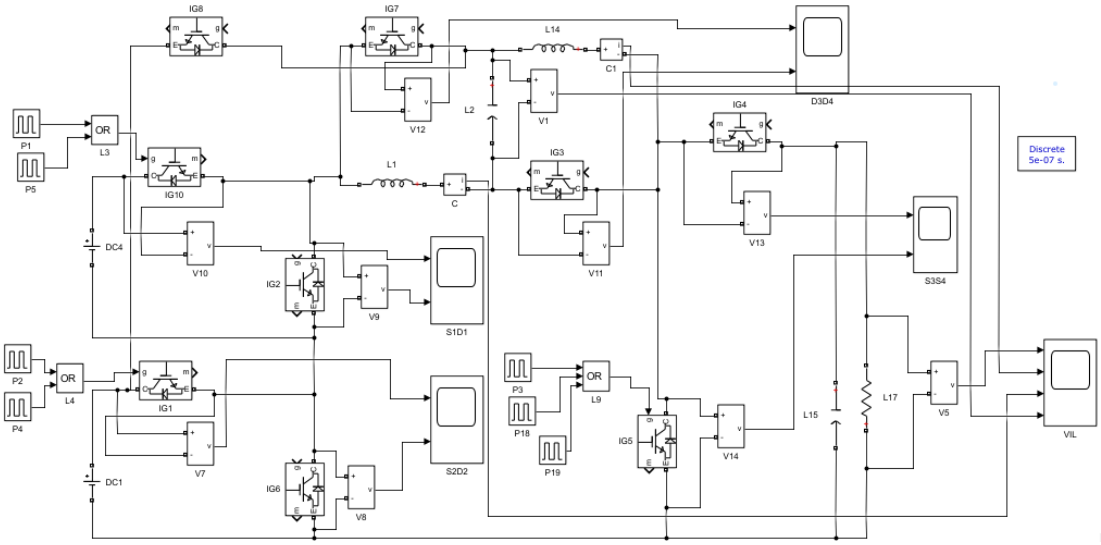


Fig. (i). Simulink model of the proposed converter

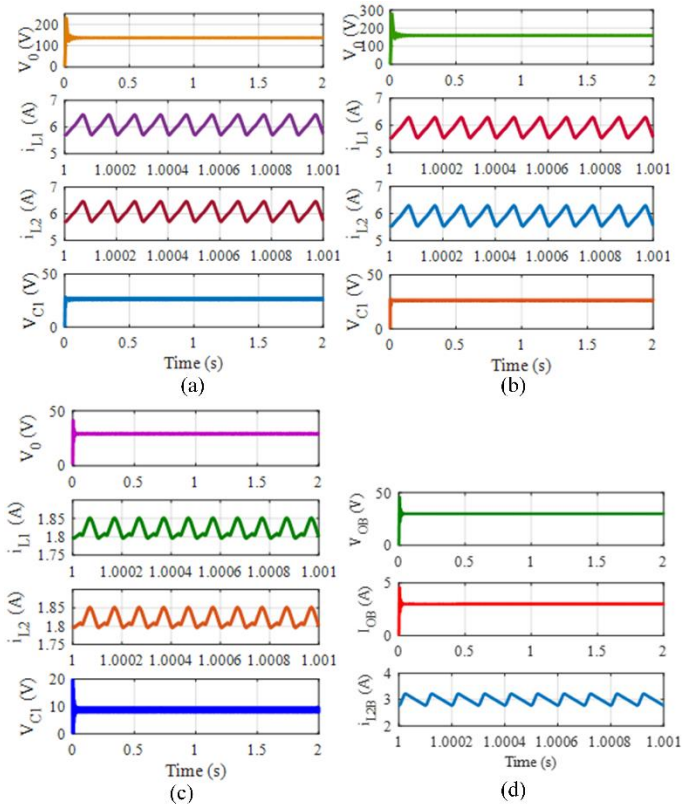
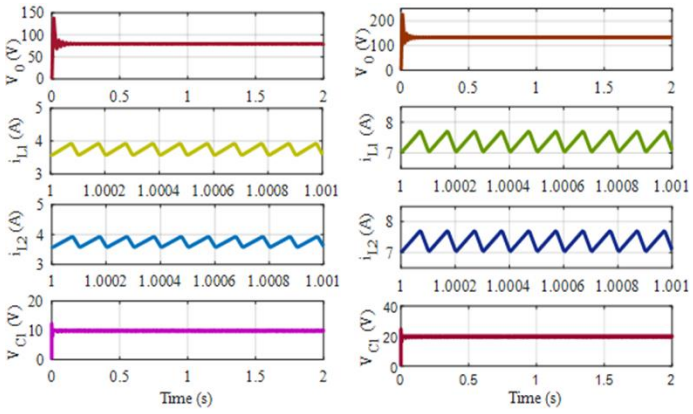
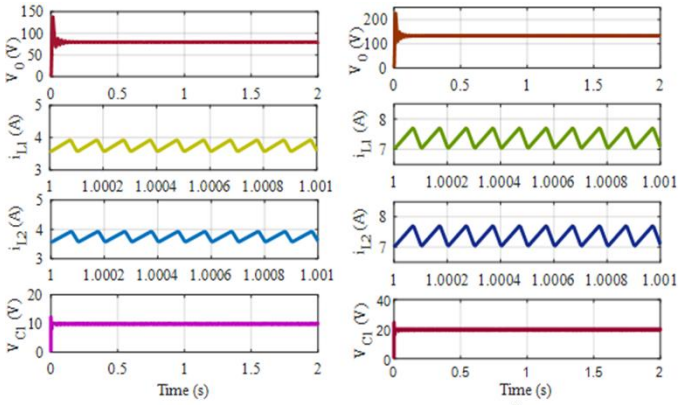


Fig. 9. Simulation results of output voltage (V_O), inductor currents (i_{L1} and i_{L2}), capacitor voltage (V_{C1}) of the proposed converter operating in different modes: (a) buck-boost mode, (b) boost mode, (c) buck mode and (d) output voltage (V_{OB}), load current (I_{OB}) and inductor current (i_{L2B}) in bidirectional mode.



(a) (b)

Fig. 10. Simulation result of output voltage (V_O), inductor currents (i_{L1} and i_{L2}), capacitor voltage (V_{C1}) in buck-boost mode at different set of input voltages and duty ratio: (a) different input voltages and (b) different duty ratios.



(a) (b)

Fig. 11. Simulation result of output voltage (V_O), inductor currents (i_{L1} and i_{L2}), capacitor voltage (V_{C1}) in buck-boost mode in: (a) V_1 in out of work and (b) V_2 in out of work.