MATLAB App

Topologies
- [x] DSHB
- [x] DSFB
- [ ] SSHB
- [x] SSFB
- [ ] SDFB

Number of cells
[x] 1	[ ] 5	[ ] 9
[ ] 2	[ ] 6	[x] 10
[ ] 3	[x] 7	[ ] 11
[ ] 4	[ ] 8	[x] 12

Number of Phases
- [x] 3-phase
- [x] 6-phase LV
- [x] 6-phase HV

Information

SM - Submodule.
SC - Semiconductor.

NOTE:
Before you run the application, kindly close 'Dasboard_raw_data.xlsx' file. To avoid program CRASH!

Error

Done!

Running

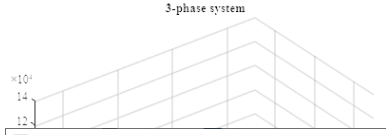
Completed

Run

Parameters | SMs and Capacity | Parallel Cells & SCs | SM Currents | SM Capacitor | Zeta and didt | Battery loss | Capacitor loss | Temperature | SC loss | Total loss | Efficiency | Converter Costs | Total Costs

Total converter costs (including capacitor costs)

3-phase system



MATLAB App

Topologies
- [x] DSHB
- [x] DSFB

Parameters | SMs and Capacity | Parallel Cells & SCs | SM Currents | SM Capacitor | Zeta and didt | Battery loss | Capacitor loss | Temperature | SC loss | Total loss | Efficiency | Converter Costs | Total Costs

Total effeciency at average power

3-phase system

6-phase LV system

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Number of Phases
- [x] 3-phase
- [x] 6-phase LV
- [x] 6-phase HV

Information

SM - Submodule.
SC - Semiconductor.

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Error

Working...

Running

Completed

Run

Parameters | SMs and Capacity | Parallel Cells & SCs | SM Currents | SM Capacitor | Zeta and didt | Battery loss | Capacitor loss | Temperature | SC loss | Total loss | Efficiency | Converter Costs | Total Costs

Converter Parameters

Average output power [W]	1e+05
Rated output voltage [V]	440
maximum modulation index	0.85
load power factor	0.9
over current factor	4
Submodule pulse number	6

Battery Parameters

Minimum battery cell voltage [V]	3.45
Nominal cell voltaeg [V]	3.7
Energy of battery pack [Wh]	1e+06
Depth of discharge	0.65
Nominal cell capacity [Ah]	28

Thermal Parameters

Maximum Ambient temperature [degC]	40
Maximum Case temperature [degC]	80
Case to ambient heat transfer coefficienct [W/m^2K]	400
MOSFET area [m^2]	0.0004
Heat transfer area [m^2]	0.0008

Cost Constants

Cost per submodule [€/SM]	50	Capacitor cost per unit[€]	1
Battery cost per kWh [€/kWh]	120		

MOSFET parameters vector

On-state resistance [Ohm]	2.5e-4 4e-4 4e-4 4e-4 4e-4 4e-4 6.	Not in Use
Thermal resistance (junction to case) [K/W]	0.61 1.2 1.2 0.61	Not in Use
MOSFET cost [€]	3 3 3 3 3 3 3 3 3 3 3 3	Not in Use

Loss claculation limits
- [ ] Loss limit Enable

Loss calculation limiting frequency [Hz]: 2e+04

Motor and drive-cycle parameters

Number of poles of motor	40	Motor Nominal speed [rpm]	1000

Battery modeling
- [x] Alelion Cell EIS data

DC-impedance frequency [Hz]: 1

Capacitor modeling

Peak RMS current for 1 series cells per submodule [A]	5
Maximum energy for 1 series cells per submodule [J]	0.008
Maximum energy for a submodule capacitor [J]	0.03
Maximum power dessipation for a submodule capacitor [W]	0.25
SM DC-link capacitor DF [%]	5
Total energy stored in SM dc-link capacitors [J]	350

- [ ] Load capacitor Energy matrix
- [ ] Optimizing minimum number of parallel MOSFETs

Relative loss reduction factor [%]: 5

- [x] Optimized pulse number and capacitor energy
- [ ] Re-optimize

Capacitor under-rating factor [%]: 10

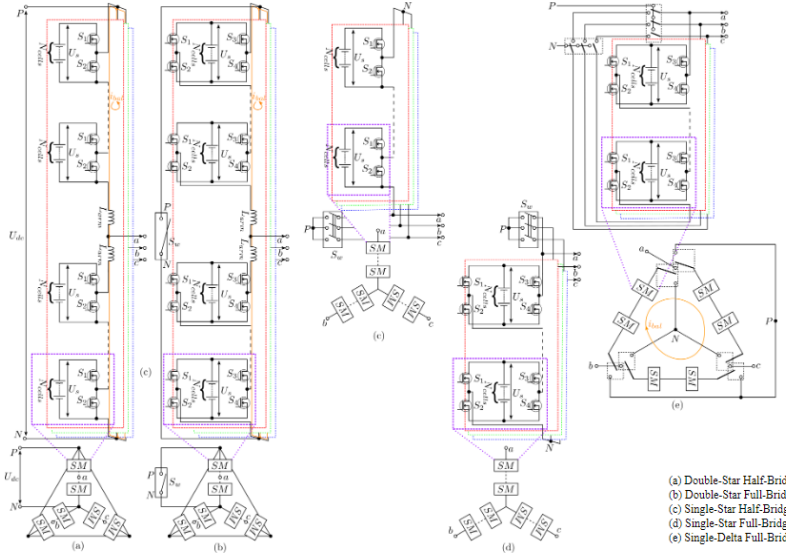
MOSFET switching parameters

Rise-time dvdt [V/us]	500
Rise-time didt [A/us]	2000
Fall-time dvdt [V/us]	500
Fall-time didt [A/us]	2000
Submodule DC voltage tolerence [%]	50
PCB paracitic inductance [H]	2e-09
Damping ratio	1.1
Minimum number of parallel MOSFETs	4
Maximum number of parallel MOSFETs	20
Battery Leads paracitic inductance [H]	2e-07
Minimum allowable di/dt [A/us]	200

2-level inverter

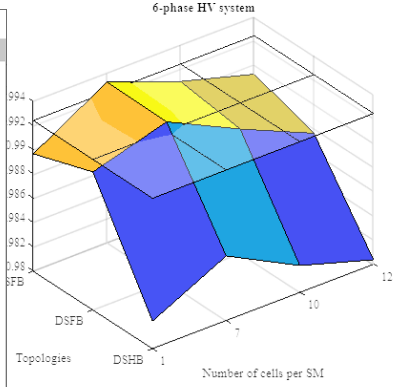
DC-link voltage [V]	800
2-level inverter pulse number	21
DC-link capacitor energy 2-level [J]	992
DC-link capacitor DF 2-level [%]	1.95
DC-link capacitor ESL [H]	6e-08
Thermal resistance case to ambient [K/W]	0.01
Battery Leads inductance 2-level [H]	1e-07

Module Selection
- (•) MOSFET - Wolfspeed CAB450M12XM3 - SiC
- ( ) MOSFET - SEMITRANS SKM260MB170SCH17 - SiC
- ( ) IGBT - IXYS MIXA300PF1200TSF - Si (Bugged)



(a) Double-Star Half-Bridge (DS-HB)
(b) Double-Star Full-Bridge (DS-FB)
(c) Single-Star Half-Bridge (SS-HB)
(d) Single-Star Full-Bridge (SS-FB)
(e) Single-Delta Full-Bridge (SD-FB)

6-phase HV system



6-phase HV system