

List of Figures

1.1	Single line network with two loads	2
1.2	SMIB model	2
1.3	SMIB model with additional load	2
1.4	SMIB model with additional load	3
1.5	Random network with three loads on multiple voltage levels	3
1.6	Complete transformer circuit	3
1.7	Reduced transformer circuit; based on Ilyas calculation	3
1.8	Transformer Pi circuit	4
2.1	Example: Control block diagram	5
2.2	Algorithmics OLTC	6
2.3	Algorithmics FSM	7
3.1	Class ViolationIntegral Diagram	8
3.2	Class CriticalTimes Diagram	8
3.3	Class NoseCurve Diagram	9
3.4	Class NoseCurve Diagram Complete	9
3.5	Class OLTC Transformer Diagram Complete	10
3.6	Class FSM discrete control	10
3.7	Class OLTC discrete control	10
3.8	Software Structure idea	11
3.9	Normal vector longitudinal ratio	12
3.10	Vectors Phase Shifter	12
3.11	Vectors Cross regulator	12

1 Grids

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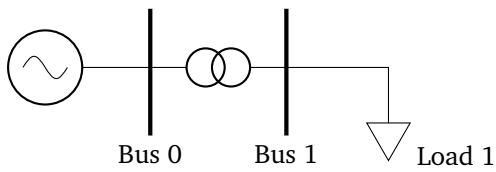


Figure 1.1: Single line network with two loads



Figure 1.2: SMIB model

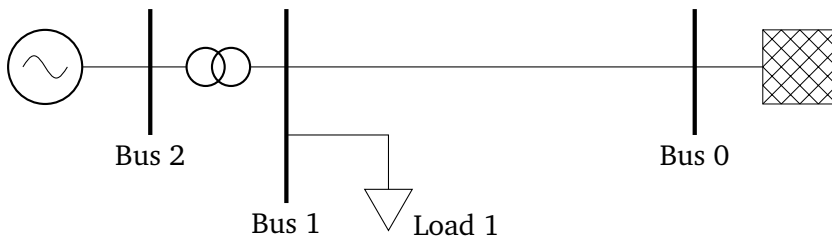


Figure 1.3: SMIB model with additional load

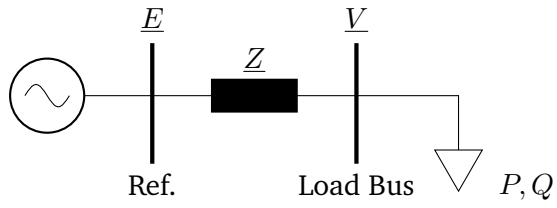


Figure 1.4: SMIB model with additional load

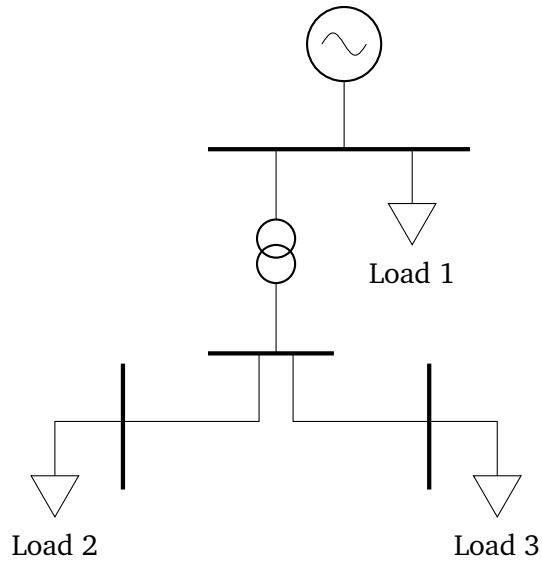


Figure 1.5: Random network with three loads on multiple voltage levels

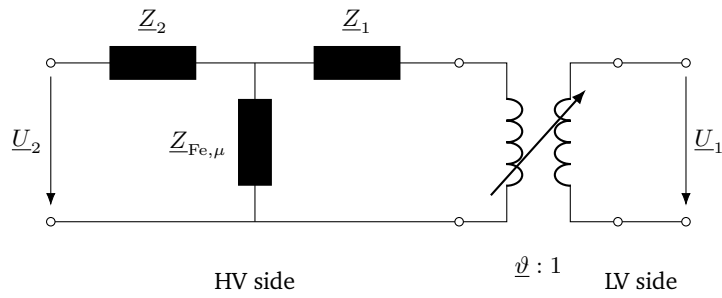


Figure 1.6: Complete transformer circuit

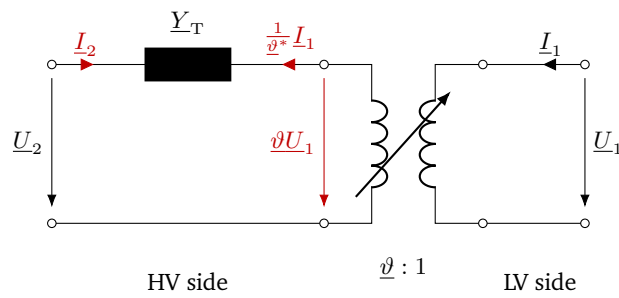


Figure 1.7: Reduced transformer circuit; based on Ilyas calculation

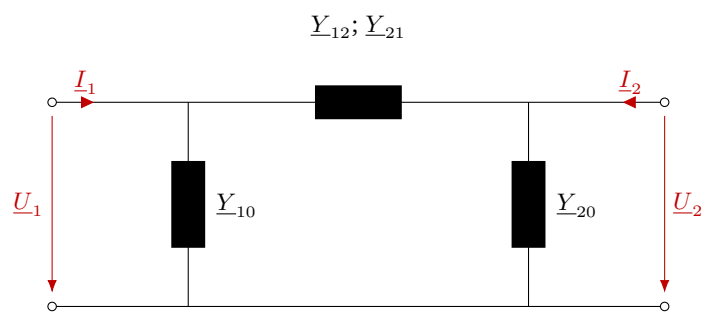


Figure 1.8: Transformer Pi circuit

2 Control Blocks

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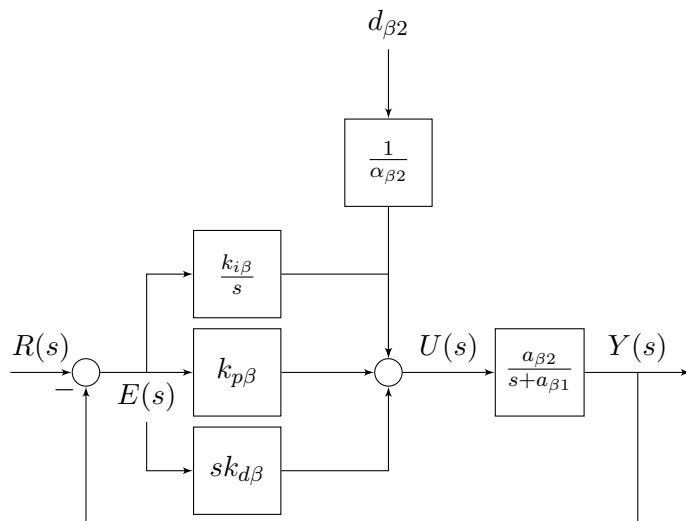


Figure 2.1: Example: Control block diagram

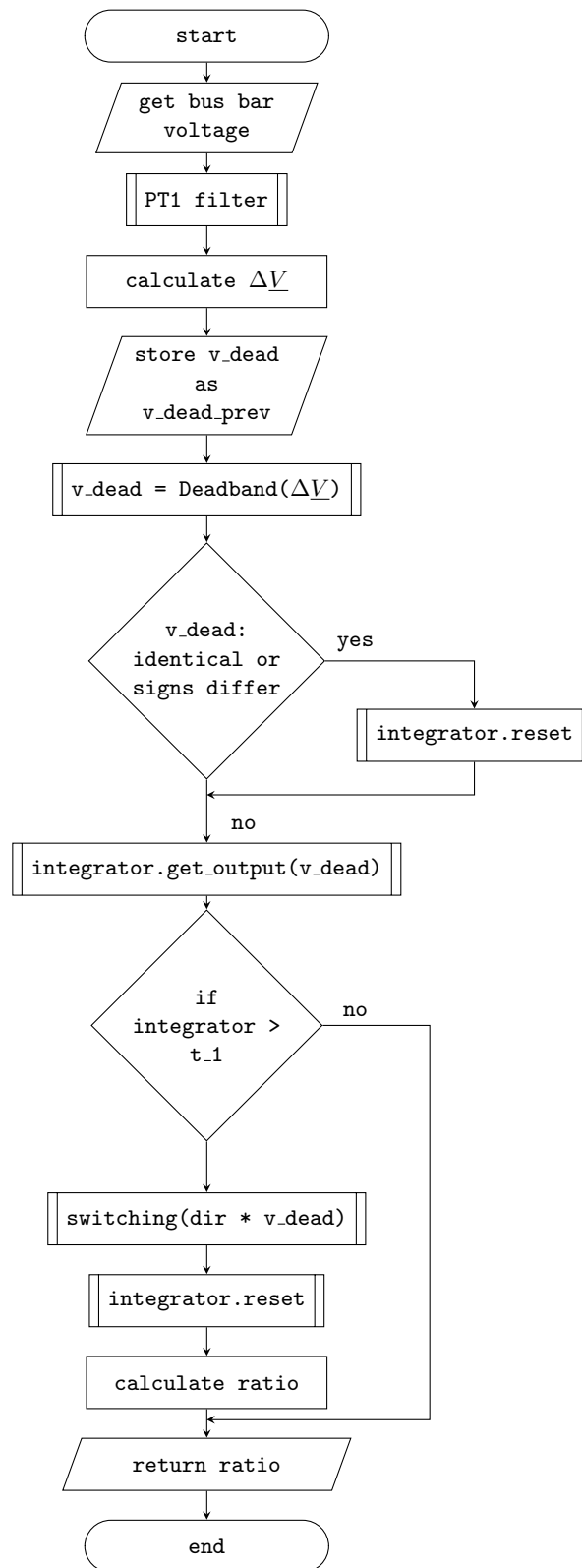


Figure 2.2: Algorithmics OLTC

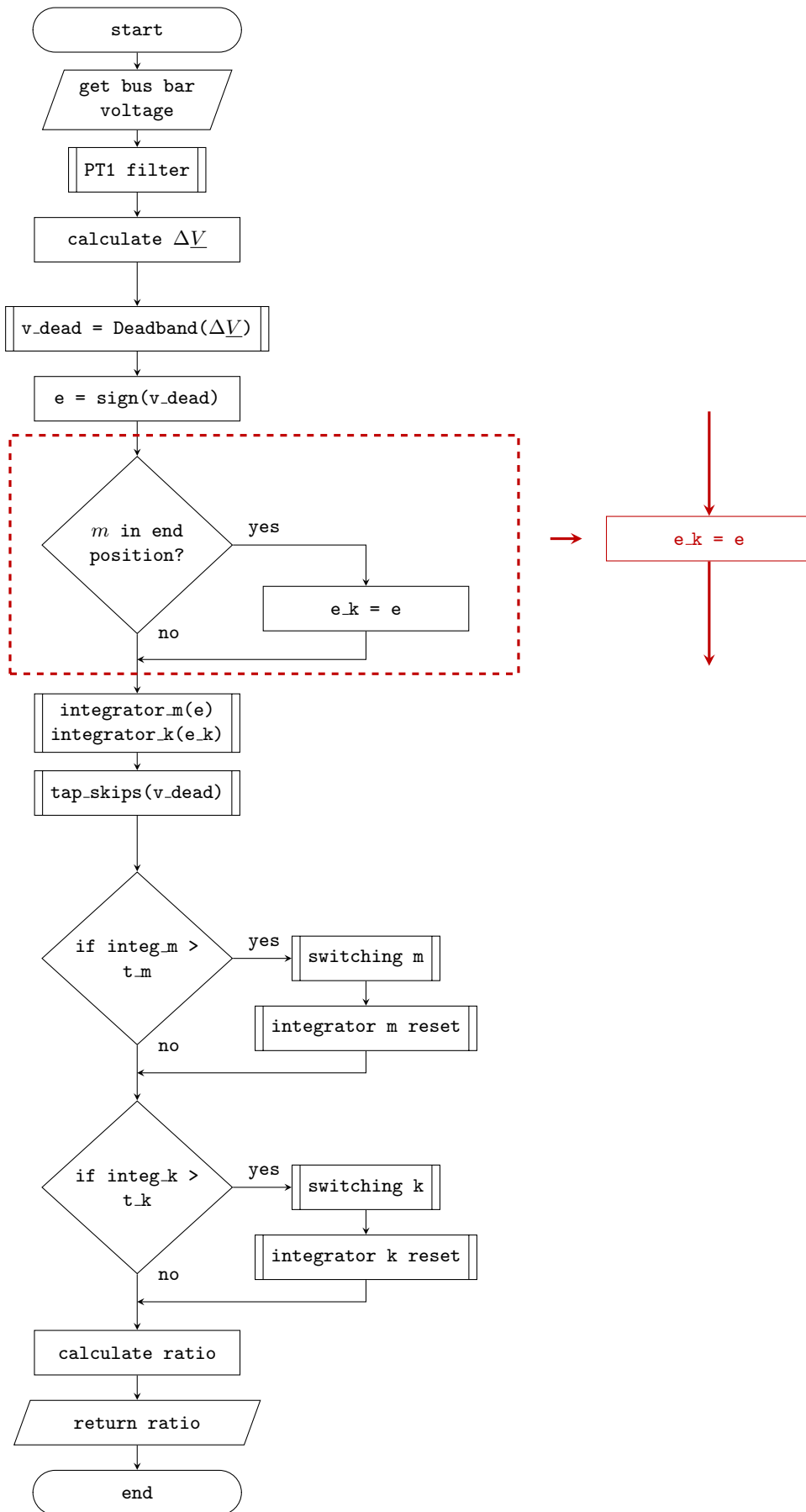


Figure 2.3: Algorithmics FSM

3 Others

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ViolationIntegral
env : str env_params : dict result : complex
get_env(time : list) : list get_result(time : list, v_bb : list) : complex set_env_parameters(env_params : dict) : None t_low(time : list) : list t_upp(time : list) : list hvrt(time : list) : list lvrt(time : list) : list

Figure 3.1: Class ViolationIntegral Diagram

CriticalTimes
frt_env : str frt_time : list tvi_env : str tvi_time : list calculation_dict : list result : dict
add_env_parameters(time : list) : None get_result(time : list, voltages : list) : dict

Figure 3.2: Class CriticalTimes Diagram

NoseCurve
res_variation results ps_sim
run_calculation run_variation_calculation plot_nose_curve plot_nose_curve_variation get_max_loadings add_load_to_plot

Figure 3.3: Class NoseCurve Diagram

NoseCurve
res_variation : dict results : dict ps_sim : object
run_calculation(bus : list) : dict run_variation_calculation(bus : list) : dict plot_nose_curve(busses : list) : object plot_nose_curve_variation(busses : list) : object get_max_loadings(busses : list) : dict add_load_to_plot(load : list, bus : str, current_plot : object) : object

Figure 3.4: Class NoseCurve Diagram Complete

OLTC Transformer
from_bus : str from_bus_id : int from_bus_name : str from_voltage : str measure_bus : str name : str s_n : float s_n_sys : float r : float x : float b : float u : float u_l : float oltc : object sim : object tap_side : str ...
calc_admittance : tensor calc_admittance_static : tensor differential : tensor get_state_vector : tensor set_state_vector(x : tensor) : None set_oltc_controller(oltc_model : object)

Figure 3.5: Class OLTC Transformer Diagram Complete

FSM1
...
differential : tensor get_output : float get_state_vector : tensor set_state_vector(x : tensor) : None switching_k(voltage : float) : None switching_m(voltage : float, tap_skips : int) : None tap_skips(voltage : float) : int

Figure 3.6: Class FSM discrete control

OLTCdiscrete
...
differential : tensor get_output : float get_state_vector : tensor set_state_vector(x : tensor) : None switching(voltage : float) : None

Figure 3.7: Class OLTC discrete control

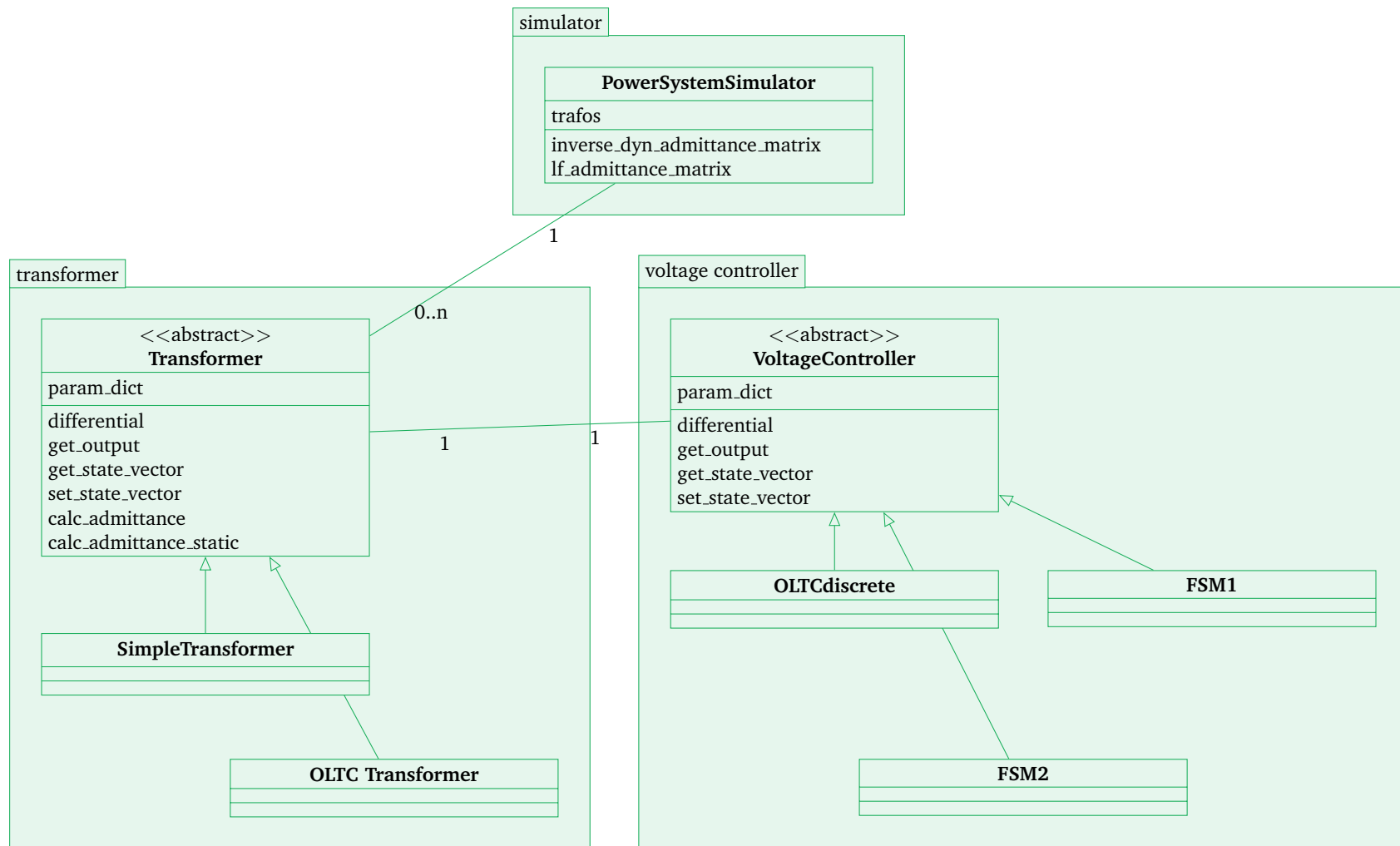


Figure 3.8: Software Structure idea

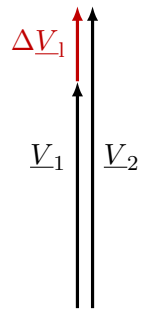


Figure 3.9: Normal vector longitudinal ratio

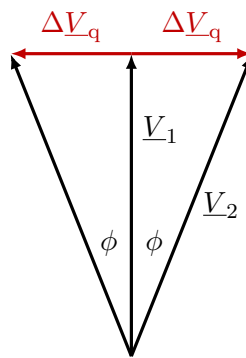


Figure 3.10: Vectors Phase Shifter

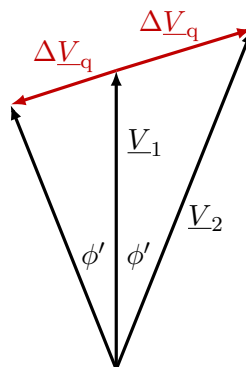


Figure 3.11: Vectors Cross regulator