

## List of Figures

# 1 Grids

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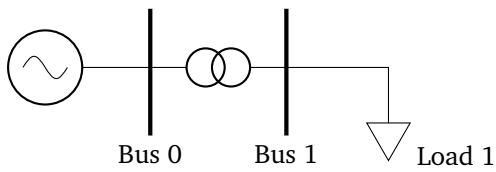


Figure 1.1: Single line network with two loads



Figure 1.2: SMIB model

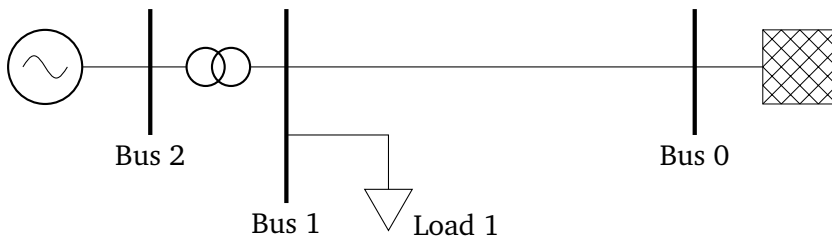


Figure 1.3: SMIB model with additional load

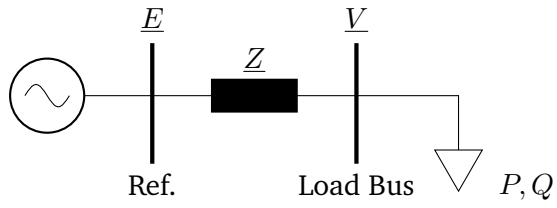


Figure 1.4: SMIB model with additional load

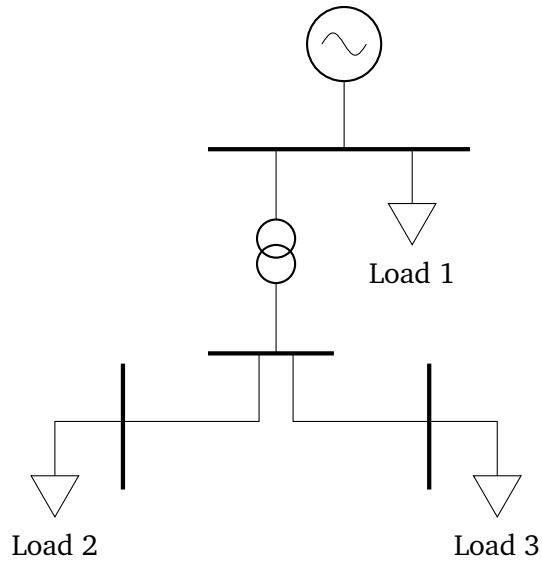


Figure 1.5: Random network with three loads on multiple voltage levels

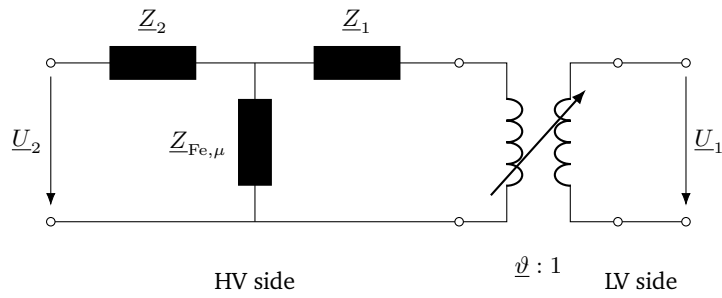


Figure 1.6: Complete transformer circuit

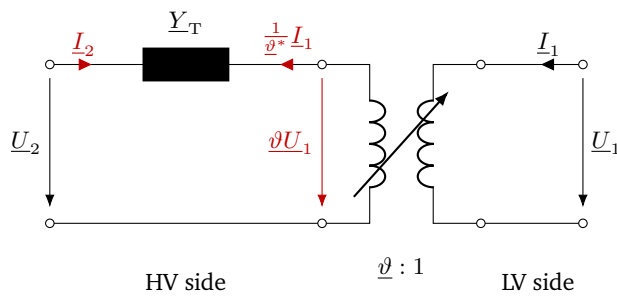


Figure 1.7: Reduced transformer circuit; based on Ilyas calculation

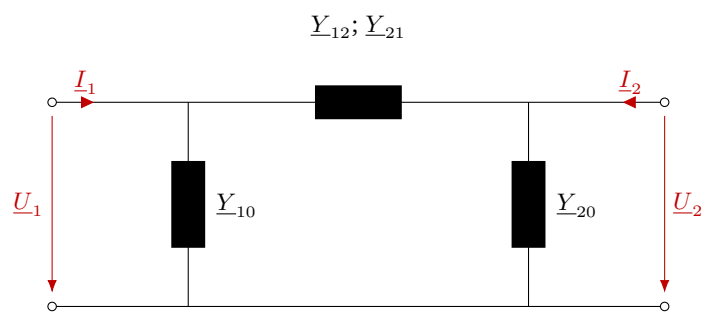


Figure 1.8: Transformer Pi circuit

## 2 Control Blocks

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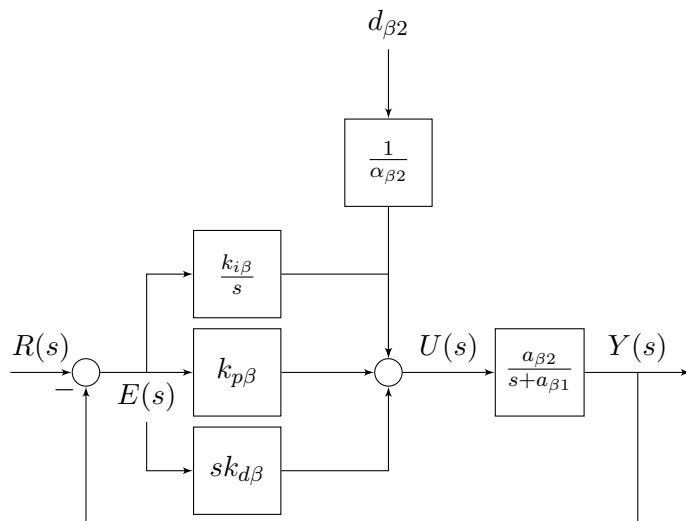


Figure 2.1: Example: Control block diagram

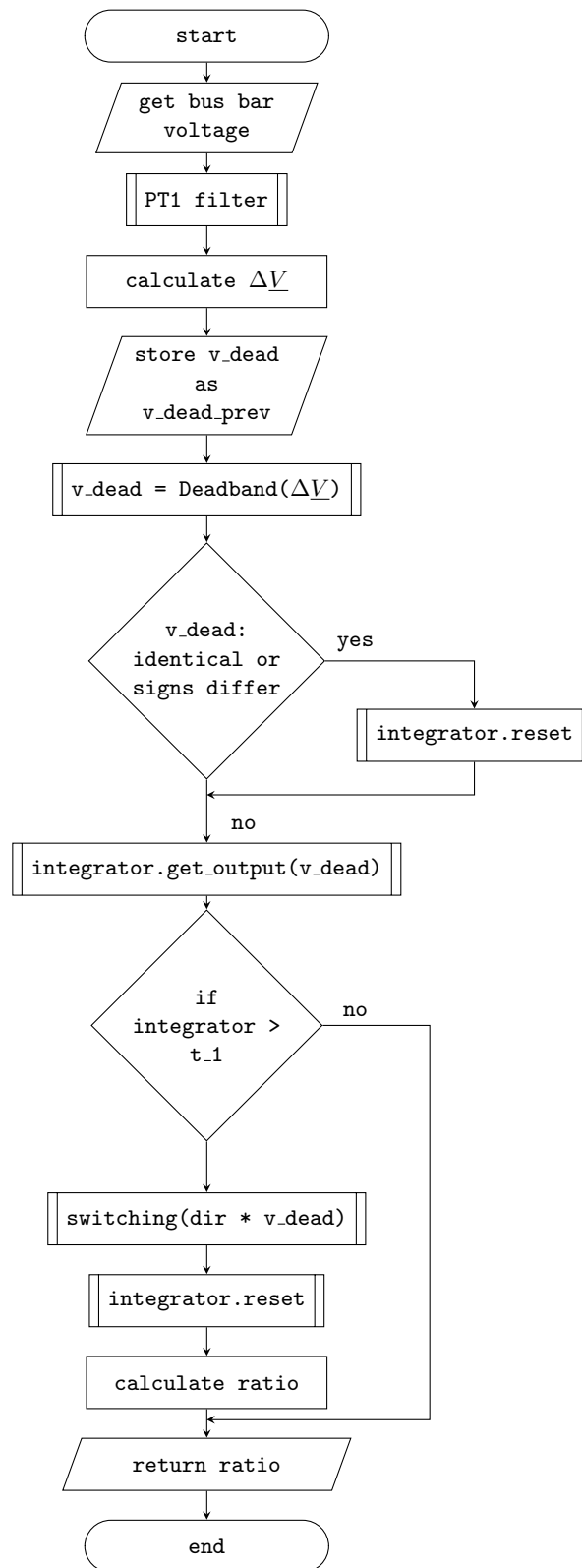


Figure 2.2: Algorithmics OLTC

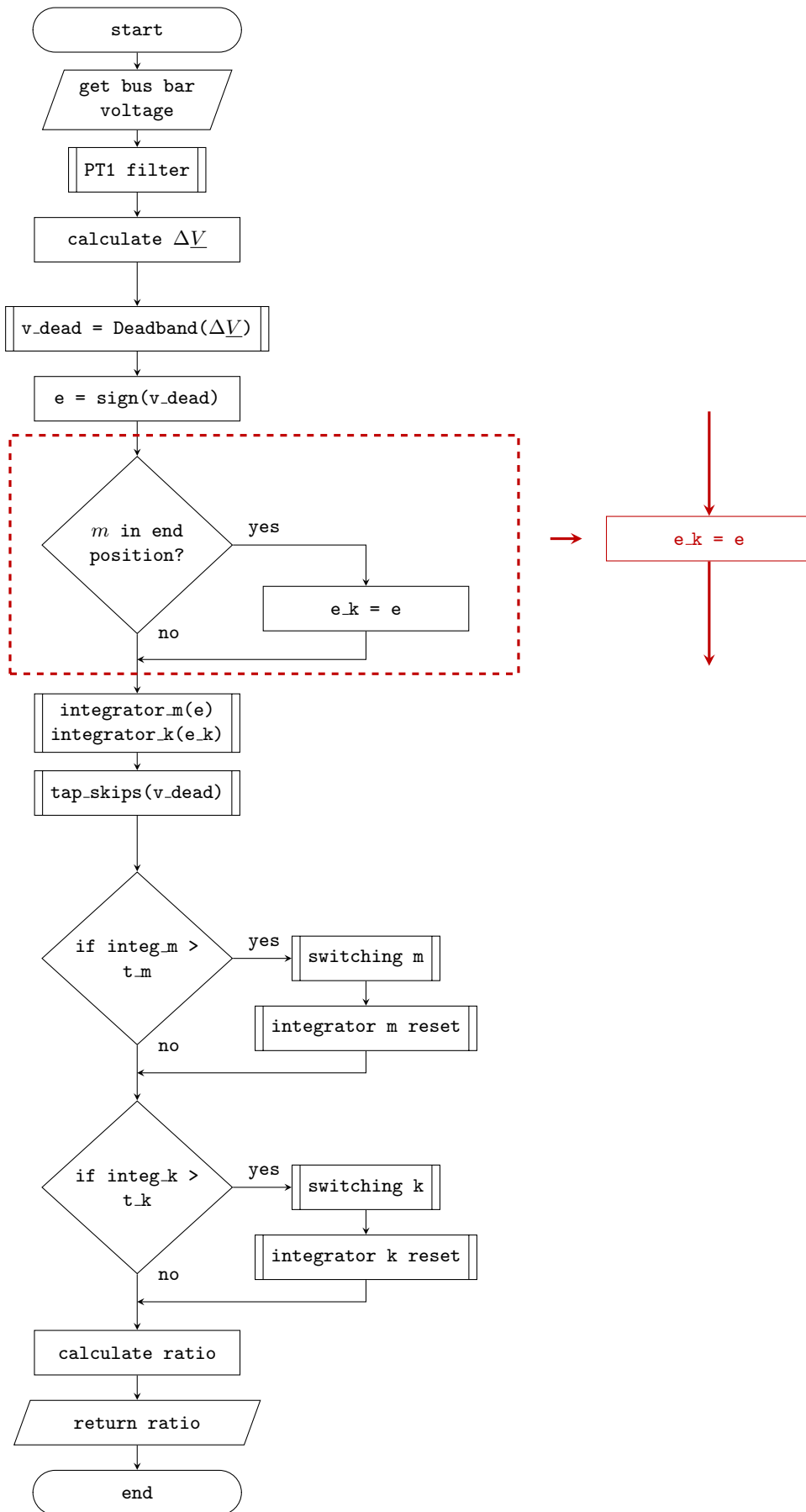


Figure 2.3: Algorithmics FSM

### 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



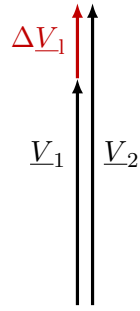


Figure 3.9: Normal vector longitudinal ratio

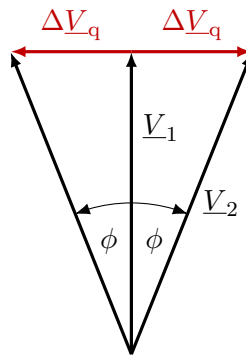


Figure 3.10: Vectors Phase Shifter

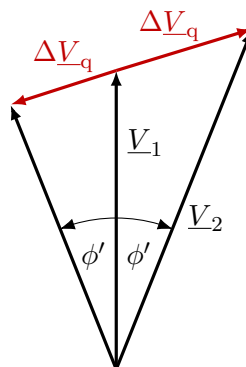


Figure 3.11: Vectors Cross regulator