The overall algorithm is in *method.m*

MATLAB function name	**Overall description and application**	**Input**	**Output**	**Section in Document**
load_generator.m	returns one set of randomly (normal distribution) generated real power for a case file	- MATPOWER library case file's name - number of buses, N	- case file with modified real power	3.3
Real_Power_SDP_AC.m	Returns the Real Power and the Angle from any test case using *runpf* (Newton-Raphson method)	- case file's name - number of buses, N	- [N x 1] vector of the real power, voltage, and angle of each of the bus	3.3
Real_Power_SDP_DC.m	See Real_Power_SDP_AC - the method used is DC power flow in *runpf*	Same as above	Same as above	4.4
DC_Power_Matrix.m	Returns the P and the "transfer matrix"($[\mathbf{\Delta A}]^T$) in $\mathbf{P} = [\mathbf{\Delta A}]^T\mathbf{B}$ (8) This function calls the all three functions above	- case file's name - number of buses, N - AC or DC *runpf*	- [N x 1] vector of the real power - [N x m] matrix of $[\mathbf{\Delta A}]^T$	3.3
opt_setup.m	Returns the P and the "transfer matrix" in $\begin{bmatrix}\mathbf{P}_1\\ \mathbf{P}_2\\ \vdots\end{bmatrix} = \begin{bmatrix}[diag(\mathbf{A}\boldsymbol{\delta_1})\mathbf{A}]^T\\ [diag(\mathbf{A}\boldsymbol{\delta_2})\mathbf{A}]^T\\ \vdots\end{bmatrix}\begin{bmatrix}b_{1,2}\\ b_{1,3}\\ \vdots\end{bmatrix}$ (10) by stacking the results from the function above (AC *runpf* only)	- case file's name - number of buses, N	- [(m * N) x 1] stacked real power vector - [(m * N) x m] big transfer matrix	3.3
Susceptance_Vector.m	Returns the solved P, transfer matrix, Susceptance, and Residue (Residue = P - transfer matrix * B), P, and transfer matrix after optimize once for the	- case file's name - number of buses, N - DC or AC runpf - 1 norm or 2 norm	- [(m * N) x 1] stacked real power vector - [(m * N) x m] big transfer matrix	4.4

			- [m x 1] B - [m x 1] Residue	
one_norm_constraint.m	Function that returns the lowest norm(susceptance,1) value	- Stacked Power Vector (per eq 10) - Stacked transfer matrix (per eq 10) - number of possible bus connections - any additional constraints (put []) for none	[double] lowest norm(susceptance,1) value	3.4.1.1
new_incident_matrix.m	Returns an updated incidence matrix by zeroing the row that corresponds to the line connection with the lowest susceptance	- Susceptance - number of buses, N - threshold of the susceptance value	- [m x N] incidence matrix	3.4
exact_susceptance.m	returns a vector with actual values of the susceptance of the lines that is connected to the specified node	- case file's name - number of buses, N	[(N-1) x 1] susceptance vector	**Error! Reference source not found.**
Topology_Error.m	To provide a measure of the accuracy of the topology estimation through the incidence matrix generated	incidence of the actual topology and the modeled topology	- Number of lines the model failed to identify - Number of lines that is imagined by the model (does not actually exist)	**Error! Reference source not found.**
set_constraint.m	returns a vector with actual values of the susceptance of the lines that is connected to the specified bus	- case file's name - number of buses, N - bus number of interest	[m x 1] susceptance vector	3.6.2

contingency_analysis.m	given the line that you want to outage, produces a case file with the results from the model. Run the outage scenario with but the regular case file and the modeled case file using DC and AC power flow to see the line loading of the regular (correct) modeled (calculated) case file	- case file's name - number of buses, N - outage to bus - outage from bus - modeled susceptance vector	Line loading of the actual and modeled susceptance under AC and DC analysis in runpf	**Error! Reference source not found.**
contingency_analysis_test.m	Example of running contingency_analysis.m	N/A	Same as above	**Error! Reference source not found.**

To run these code, make sure that YALMIP, Gurobi, and MATPOWER is installed, and the path to their perspective directory is added to MATLAB path, as per below:

```
addpath('Desktop\Final\matpower6.0')
addpath('C:\gurobi751\win64\matlab')
addpath('C:\YALMIP-master')
addpath('C:\YALMIP-master\extras')
addpath('C:\YALMIP-master\demos')
addpath('C:\YALMIP-master\solvers')
addpath('C:\YALMIP-master\modules')
addpath('C:\YALMIP-master\modules\parametric')
addpath('C:\YALMIP-master\modules\moment')
addpath('C:\YALMIP-master\modules\global')
addpath('C:\YALMIP-master\modules\robust')
addpath('C:\YALMIP-master\modules\sos')
addpath('C:\YALMIP-master\operators')
```