Guidelines for using the ADS simulation files and importing/exporting data from MATLAB (SISO case)

1) Open the workspace “SISO_wrk” in ADS. The following window shown in Figure 1 is displayed.

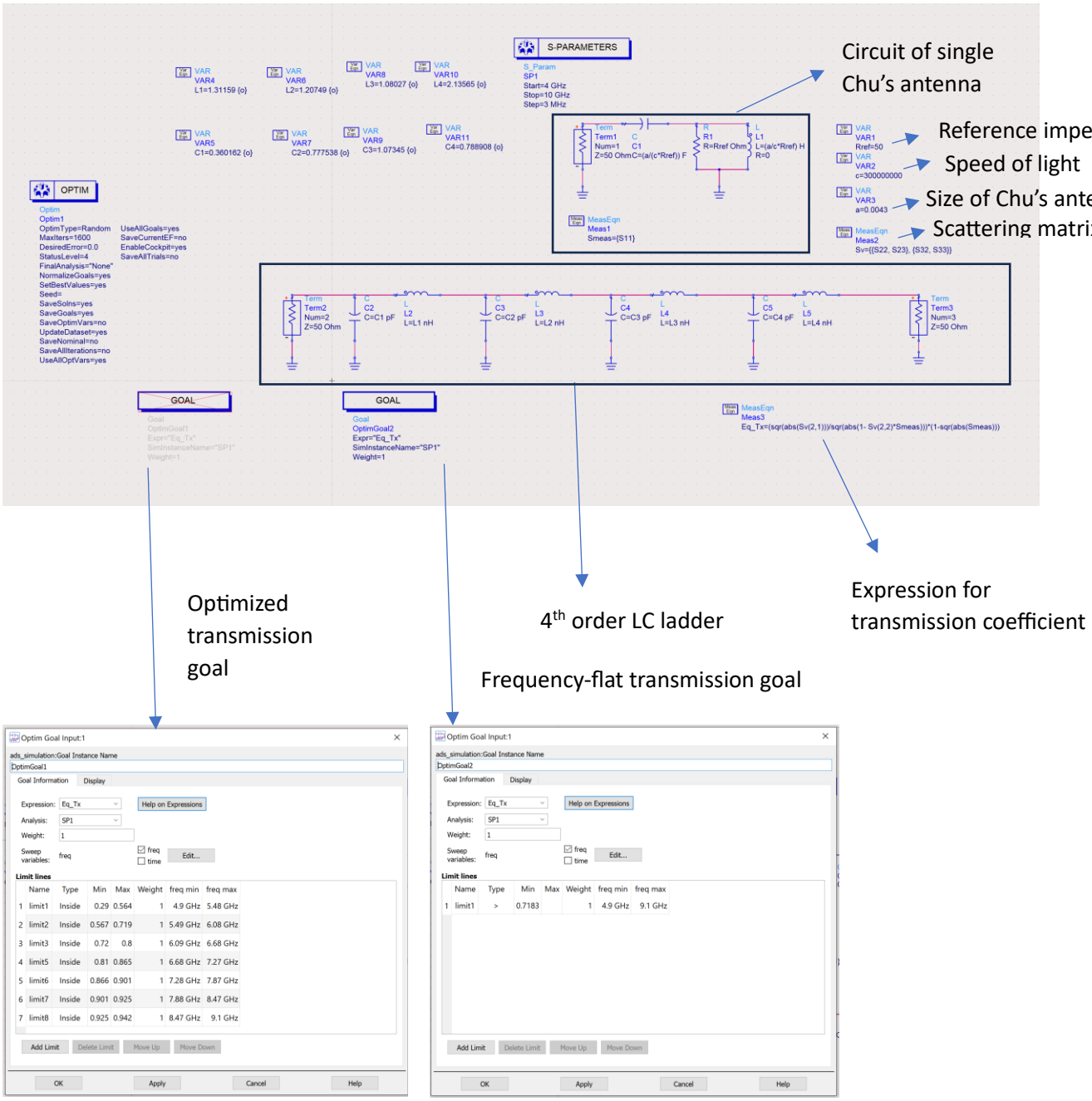

Figure 1: Schematic for SISO case in ADS. This figure shows the circuit schematic for the single Chu’s antenna and the fourth-order LC ladder circuit. The S-parameters are obtained from frequencies 4GHz to 10 GHz with a step size of 3 MHz. “Meas3” is the implementation of the transmission coefficient expression as given in eqn 8 and eqn 9 in Globecom paper. The variable “Eq_Tx” is used for setting the optimization goals. OptimGoal1 is for the optimized transmission goal and OptimGoal2 is for the frequency-flat transmission goal.

2) Possible modifications in the design:
    a. The size of the Chu's antenna (depends on the center frequency)
    b. The measurement bandwidth in the S-parameters block shown in Figure 1
    c. Order of LC ladder (Remember to introduce extra variable names if you increase the length of the LC ladder. For optimizing the new variables, you need to add them manually using the "Simulation Variables Setup" option under the "Simulate" tab.)
    d. Optimization goals- The values for OptimGoal1 are obtained using the quantize_tx_coeff() function in MATLAB file "Main_SISO_achievable_rate.m"
    The number of quantization levels for the transmission coefficient can be increased by changing the variable sub_groups_num in the MATLAB code. The upper and lower frequency range can be changed depending on the choice of the bandwidth variable in MATLAB code
3) After simulating the design, the following window shown in Figure 2 is displayed. By clicking on the plot of Eq_Tx, export the plot in the tab-delimited ASCII format. This format is then read in MATLAB file "Main_SISO_achievable_rate.m" using tdfread() function and used for generating plots for SNR, transmission coefficient, and achievable rate.

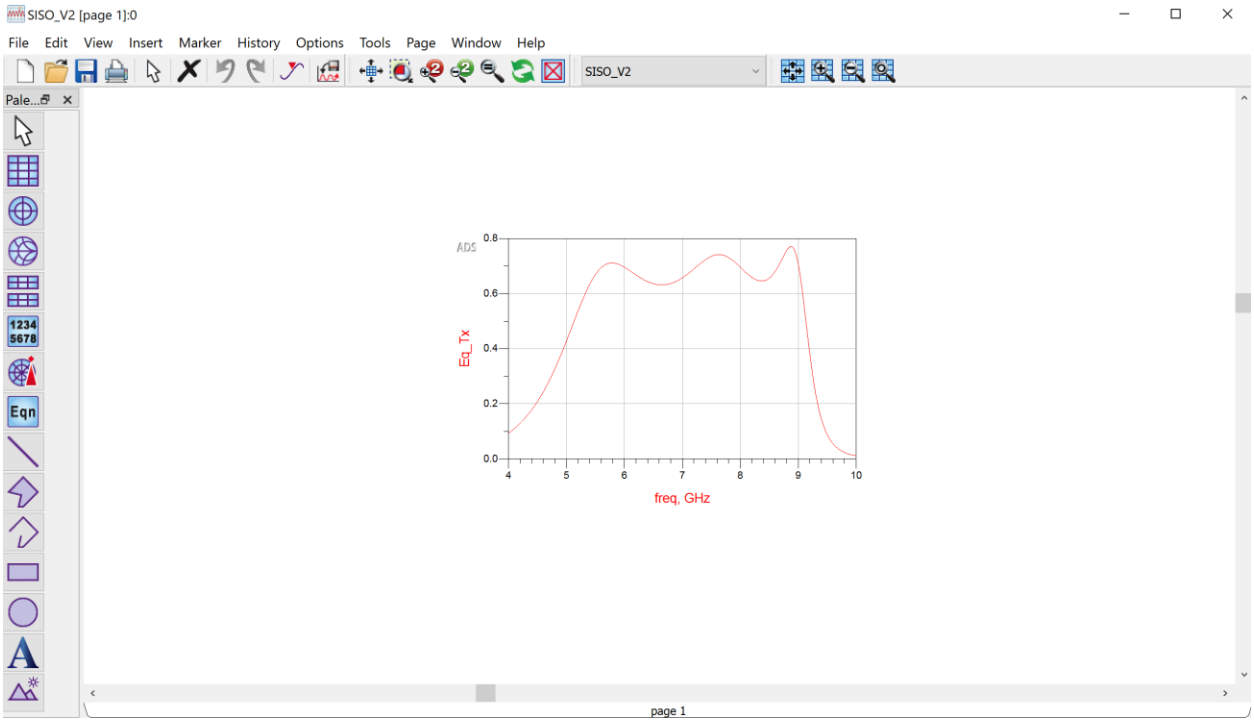

Figure 2: Window after the simulation is done. The plot is exported in the tab-delimited ASCII format saved as a .txt file and can be read by MATLAB script.