ABSTRACT

The nonlinear transmission line (NLTL) is the most common medium for soliton generation and propagation in electronics. It has a wide range of applications in nonlinear dynamics and practical applications in ultra-sharp pulse/edge generation. Different experiment on electrical soliton propagation in NLTL are performed and explained in this thesis.

Schottkey diodes at reverse bias condition are.used for nonlinear capacitance. The Schottky diode 1N5819 and inductance L= 1 μH, 22 μH are used in experiments. First set of experiments show the effects of input pulse frequency and input capacitance on different characteristics of soliton for 1μH inductance. The varied input frequency has values 0.1 MHz, 1MHz, 1.5MHz and varied input capacitance has values 100pF, 150pF, 200pF, 250pF, 300pF. Second set of experiments shows the effects of input pulse voltage and input pulse shape on different soliton characteristics for inductance values 1μH and 22μH both. The varied input pulse voltage has values 5V, 10V, 15V and varied input pulse shapes are square, triangular and sinusoidal.

The results of experiments reveal that for soliton generation only small length of NLTL is sufficient. Due to dissipation, solitons exhibit damping while propagating in NLTL. This damping increases with increase in the frequency and amplitude of input pulse. Amount of input pulse energy is controlled by input capacitor. Amplitude of solitons increases with increasing values of input capacitance. For higher inductance values balance between non-linearity and dispersion occurs quickly than lower inductance values.