# ABSTRACT

Nonlinear Transmission Lines (NLTLs) serve as nonlinear dispersive media which can sustain nonlinear structures like solitons, shock waves etc., if the nonlinearity is balanced by dispersion or dissipation in the system. NLTLs can be constructed in laboratory by using a periodic LC network having linear inductors and nonlinear capacitors or nonlinear inductors and linear capacitors. The nonlinearity in the system is due to the voltage dependence of the capacitance of the nonlinear capacitors (varactors) and dispersion arises from the periodicity in the structure of the NLTL. In a lossy NLTL the presence of resistive elements in the circuit can lead to dissipative processes. In this research work an appropriate analytical model is proposed to study the propagation of nonlinear structures in a frequency dependent lossy NLTL. Kirchhoff's voltage and current laws will be used to carry out the basic calculations of the NLTL. Reductive perturbation will then lead to a modified form of KdV-Burgers equation, called S-KdVB equation that has fractional nonlinear term. In this equation, both dispersive and dissipative effects are present. If small effect of dispersion exists, then nonlinearity is balanced out by dissipation that results in the formation of step-like structure (shockwave). And nonlinearity is balanced out by dispersion, if small effect of dissipation is present in the system that produced damped soliton like structure. Finally, the impact of resistances in nonlinear structure due to the frequency dependent loss in NLTL is shown in the results. And it has been investigated that small value of resistance can give rise to shock waves but large value of resistance provides more dissipative effect than needed and disturbs the balance between dissipation and nonlinearity that eventually destroys the formation of shock waves if dominant effect of dissipation is taken into consideration.