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In this report, two integral equation representations for a Helical antenna are derived. Analytical expressions for the natural frequencies and natural modes are calculated using Hallen type integral equation for a loosely wound helix, while an integral equation of Pocklington type is used to calculate these numerically for a helix of arbitrary pitch angle.

Using the Moments Method, the natural frequencies of the helix are calculated for various pitch angles and number of turns. Trajectories of these natural frequencies are also shown. Damping constants of the natural frequencies are relatable to the radiation characteristics of an antenna. Using these natural frequencies, an efficient helical radiator can be constructed.