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2P11 - NLTL Frequency Chirp through Dynamic Bias of Inductor Cores

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Nonlinear transmission lines (NLTL) have demonstrated the ability to convert a low-frequency video pulse into a narrowband RF packet whose frequency may vary from pulse to pulse. Synchronous wave magnetic NLTLs achieve this via a DC current bias prior to the launch of a video pulse which sets the subsequent shock velocity and thus the RF frequency. This paper explores the idea that a dynamic (time-varying) bias waveform can yield NLTL RF output with a chirp frequency characteristic by varying the shock velocity along the length of the line. A low power NLTL was utilized to prototype the concept using 1 kV –3 kV input drive, 0 –150 V bias waveform, and 0 –1 A DC bias current. The center frequency output of the low power NLTL ranges from 120 MHz –260 MHz, which varies with bias current and drive voltage, and has RF pulse widths between 50 ns and 300 ns. The optimization of the input waveform required to produce a chirp output waveform and experimental characterization of various dynamic bias waveforms on a low power test bed are described.

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